THE IDCOR PROGRAM--SEVERE ACCIDENT ISSUES, INDIVIDUAL PLANT EXAMINATIONS AND SOURCE TERM DEVELOPMENTS

Anthony R. Buhl, James C. Carter, Mario H. Fontana, Robert E. Henry* and Harold A. Mitchell

Energex Associates, Inc., Oak Ridge, Tennessee 37820

*Fauske Associates, Inc., Burr Ridge, Illinois 60521

ABSTRACT

The Industry Degraded Core Rulemaking (IDCOR) Program has established a technical foundation for resolving the severe accident issues associated with the operation of light water reactor (LWR) nuclear power plants. The technical program began in early 1981 and was completed by 1984. IDCOR cam to three primary technical conclusions and one major policy conclusion.

- First, the probabilities of severe nuclear accidents occurring are extremely low.
- Second, the fission product source terms--quantities and types of radioactive material released in the event of severe accidents--are likely to be much less than had been calculated in previous studies.
- Third, the risks and consequences to the public of severe nuclear accidents are significantly below those predicted by previous studies and are much smaller than the risk levels incorporated in the NRC interim safety goals.
- From a policy standpoint, IDCOR concluded that major design or operational changes in reactors are not warranted.

The IDCOR program was extended through 1985 with the following new directions:

- To maintain an industry presence with the NRC to close open technical issues and assure appropriate industry input into the NRC decision processes.
- To deomonstrate generic applicability of IDCOR results and support the development of an integrated approach for individual plant examinations.
- To use IDCOR results and other information to improve the source terms used in regulatory nuclear plants and to improve emergency planning.

this presentation provides the status of the IDCOR efforts on all three fronts.

KEY WORDS: Industry Degraded Core Rulemaking Program, severe accidents,

individual plant examinations, source terms, policy making

The Response to TMI

The accident at Three Mile Island (TMI) on March 28, 1979, prompted new initiatives for nuclear safety. The TMI degraded core reached conditions far more severe than those in a design basis accident. Several public inquiries questioned the existing regulatory process for licensing nuclear power plants.

As a result of the degraded core accident at TMI and subsequent re-evaluation of regulatory processes, the NRC initiated, on October 2, 1980, a "long-term rulemaking to consider to what extent, if any, nuclear power plants should be designed to deal effectively with degraded core and core melt accidents" (NRC, October 2, 1980). The NRC's rulemaking proposed to address the objectives and content of a degraded core-related regulation, the related design and operational improvements under consideration, their effects on other safety considerations, and the cost and benefits of design and operational improvements.

Recently, the NRC issued a Severe Accident Policy Statement (NRC, August 8, 1985) which withdrew the October 2, 1980, Advance Notice of Rulemaking and replaced it with a severe accident decision process on specific standard plant designs and with individual examinations for existing plants.

IDCOR: An Integrated Industry Evaluation

In late 1980 and early 1981, the nuclear industry organized an independent evaluation of the technical issues related to potential severe accidents in nuclear power plants with LWRs. The IDCOR technical program began in March 1981, under the direction of a Policy Group chaired by John Selby, Chairman of Consumers Power Company. A 12-member Steering Group chaired by Cordell Reed, Vice President of Commonwealth Edison Company, administers the Policy Group's direction and acts as the executive committee for IDCOR. The IDCOR Program Manager, originally Technology for Energy Corporation, then ENERGEX, and now IT provides the day-to-day program management

The history, organization, technical program structure, and technical results of IDCOR are well documented (Fontan, November 1981; Buhl, October 20, 1982: Buhl, September 18-21, 1983; Fontana, August 28 - September 1, 1983; Sears, July 15-19, 1984; Fontana, September 11, 1984; Buhl, March 10-13, 1985; and Buhl, May 19-22, 1985.) Background material from the IDCOR program will not be repeated here except as needed to set the stage for describing IDCOR's present activities.

IDCOR developed a long list of severe accident issues and reviewed these with the NCR, Advisory Committee on Reactor Safeguards (ACRS), and many other interested organizations, both foreign and domestic.

This paper will address the following topics:

- IDCOR Contributions to Severe Accident Technology
- IDCOR Program for 1985
- NRC Interaction Process
- Major Technical Issues and Prescription for Resolution
- Individual Plant Evaluation Methodology

• Source Term Program

IDCOR CONTRIBUTIONS TO SEVERE ACCIDENT TECHNOLOGY

The original IDCOR mission was to gather and critically review existing technical work related to the severe accident issues and to perform the additional technical work required to develop a comprehensive and thorough understanding of these issues. IDCOR also served as the industry spokesman with the NRC on these matters.

IDCOR selected four reference plants, which are representative of the reactor and containment designs in the United States, for the most extensive technical evaluation of power plant response to severe accidents ever performed. The four plants selected for detailed analysis were: (a) Zion (Westinghouse pressurized water reactor (PWR) with a large dry containment system); (b) Sequoyah (Westinghouse PWR with ice condenser containment); (c) Peach Bottom (General Electric boiling water reactor (BWR) with Mark I pressure suppression containment); and (d) Grand Gulf (General Electric BWR with Mark III pressure suppression containment).

Accident progressions from initiation to core melt and containment failure were analyzed and quantified by IDCOR. In order to perform these analyzses, IDCOR developed a new suite of physical and chemical models, data, and computer codes based on analytical and experimental data from government and industrial research programs in several countries.

Application of this new understanding of key phenomena and new analytical techniques has yielded major new conclusions on the changes of occurrence and on the consequences of severe accidents (Fontana, November 1984). The key findings are:

- The release of fission products is greatly influences by the containment features and plant systems found in existing light water reactors (e.g., primary systems, containment volumes, suppression pools, and ice beds).

- The accident sequences which dominate the risk from severe accidents can be represented by a few categories of functional failures (e.g., pipe breaks with loss of emergency cooling, blackout, and transients with failure of decay heat removal).

- The frequency of these accidents is extremely low and only a small fraction of these lead to significant environmental releases.

- Debris from severely damaged cores can be cooled for an indefinitely long time, given water, power, and ways to remove the residual heat generated by core debris materials. The containment can hold in radioactivity for an indefinite period under these conditions.

- Previous risk studies, notably the 1975 NRC Reactor Safety Study, identified three mechanisms by which containments could fail early in an accident sequence: steam explosions, high pressures produced by rapid steam generation, and hydrogen combustion. Those postulated failures were the result of the overly conservative calculations and assumptions used in previous studies.

The IDCOR studies show that steam explosions and rapid steam generation are not likely to be the cause of early containment failure. Hydrogen detonation cannot occur in prototypical reactor accident conditions and hydrogen combustion would not cause failure of large, dry containments. Small containments have hydrogen control measures, such as inerted containment or igniters, that would be effective if needed.

- If containment should fail, failure would occur many hours after the start of the accident. Because of these long times before containment failure, there would be enough time to reduce the risk to the public by at least two methods: reactor operator intervention to correct the error or condition, and if that was not completely successful, emergency response measures away from the reactor. These long times also allow for reduction in the radioactive fission products that could be released by natural processes such as settling to the floors of the containment building.

There is one exception to this general rule. One BWR accident sequence is calculated to have a short time before containment fails. However, the amount of radioactive fission products that would be released to the environment would be small because of the filtering action of the suppression pool which is part of that design and existing emergency procedures.

- If a containment should reach failure pressure or temperature, it would be expected to fail by creating a small leak which would preclude further pressure increase and subsequent large size failure. In addition, IDCOR has shown that resuspension of previously settled fission products would not occur even during rapid depressurization caused by large size containment failure.

- Although it is possible that containment could be bypassed by simple events that have nothing to do with accident sequences, such as leaving a door or vent open by mistake, the likelihood of these conditions, given frequent inspection, is small. Even if the containment was to be partially circumvented by this or similar events, IDCOR calculated that the added risk to the public would be small.

- Fission product release to the environment, even if containment should fail, would be much less than estimated in past studies. Most accident sequences lead to volatile releases of one percent or less. A few exceptional accident sequences, as described above, lead to volatile releases of 10 percent or less. This is due to a number of factors. Some of them increase the estimated release while others decrease it.

Taken together, these factors decrease the effect on the public. The major reasons are: (a) more realistic analysis of core damage processes; (b) improved understanding of pressure and temperature loads on containment; (c) better understanding of the chemical and physical forms of fission products which have lower vapor pressures and less mobility than the forms assumed in prior analyses; and (d) more realistic analyses of the transport of these fission products from the fuel, through the primary coolant system, and in the containment system.

- The so-called "China Syndrome", where a mass of molten core debris penetrates the bottom of the reactor and the containment basemat, has been evaluated. If containment should fail by this mode, it would usually be much later than a failure due to high pressures. In any case, if this event were to occur, its added risk to the public, compared with other accident sequences, would be small.

Most of the discussion so far has dealt with events that are not caused by humans, at least directly. Humans can both start accident sequences by errors or halt them by taking corrective action. Whether corrective action can be counted on will depend, to a large extent, on how fast the accident sequence proceeds.

IDCOR found that most potentially severe accidents progress slowly, and that there are ample opportunities for human intervention to halt and reverse events. The industry has emergency procedure guidelines which direct the operator to act in accordance with a limited set of observed symptoms, without requiring diagnosis of a large mass of information. These guidelines correctly assist the operator and allow him multiple opportunities to prevent and terminate severe accidents.

The IDCOR analyses of the reference plants showed that those risks are generally less than those presented in previous studies. For example, in contrast to prior evaluations, the IDCOR calculations of consequences of severe accidents show that no early fatalities would result.

However, some risk is calculated as latent fatalities over a 30-year period. The risks calculated by IDCOR are less than those in previous studies, and much smaller than those set forth in NRC's interim safety goals.

Figure 1 illustrates the range of risks for the four reference plants calculated by IDCOR and contrasts these with pre-IDCOR values, the NRC interim safety goal, and normal cancer fatalities expected for the population over a thirty-year period.

IDCOR came to three primary technical conclusions and one overall policy conclusion.

- First, the probabilities of severe nuclear accidents occurring are extremely low and only a small fraction of those sequences result in significant releases.

The risk of latent cancer fatalities from operating the IDCOR reference nuclear plants is 1,000 times lower than the interim NRC safety goal. The risk from potential severe accidents at these plants is only one millionth of the normally occurring cancer fatalities for the population living within 50 miles of the plants.

- Second, the fission product source terms--quantities and types of radioactive material released in the event of severe accidents--are much less than were calculated in previous studies.

- Third, the risks and consequences to the public of severe nuclear accidents are significantly below those predicted by previous studies and are much smaller than the risk levels incorporated in the NRC interim safety goals.

- From a policy standpoint, IDCOR concluded that major design or operational changes in reactors are not warranted.

THE IDCOR PROGRAM FOR 1985

Based on the findings of NRC and IDCOR, the Commission has agreed with IDCOR's overall conclusion that major backfits to plants are not needed for severe accidents (Nuclear Regulatory Commission, August 8, 1985). The Commission and staff now believe that only confirmatory research and individual plant evaluations are needed to resolve the long-

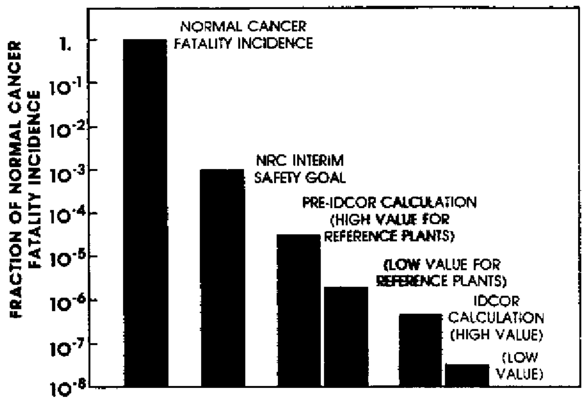

Figure 1.

Risk of Latent Cancer Fatalities From IDCOR Reference Plants

The risk of latent cancer fatalities from operating the IDCOR reference nuclear plants is 1,000 times lower than the interim NRC safety goal. The risk from potential severe accidents at these plants is only one millionth of the normally occurring cancer fatalities for the population living within 50 miles of the plants.

standing severe accident issues for existing plants.

The industry has maintained an IDCOR presence for several reasons. First, all technical issues have not been resolved. Second, IDCOR is developing the methodology needed to perform the individual plant evaluations now being required by the NRC. Third, the industry can take advantage of the reduced source terms from IDCOR to obtain relief in emergency preparedness and perhaps in other areas as well.

IDCOR has pursued three basic objectives in 1985:

1) Resolving the remaining technical issues with NRC.

2) Developing and obtaining NRC and industry acceptance of an individual plant analysis methodology for demonstration of generic applicability of the positive IDCOR severe accident conclusions.

3) Developing the technical basis for changes in regulatory requirements for emergency planning through utilization of new source term information.

Technical Resolution of Open Issues

IDCOR has assessed the original set of technical issues and identified a few key issues that needed to be addressed in 1985. IDCOR initiated specific tasks to develop additional technical information on these issues. Resolution is progressing through meetings with NRC senior management and technical exchange meetings with NRC staff. The technical exchange meetings are better defining the issues and working toward agreement on an acceptable basis for resolution. Senior management meetings between IDCOR and the NRC are guiding this process.

Individual Plant Methodology for Generic Applicability and Individual Plant Evaluations

IDCOR is developing a methodology for demonstrating whether individual plants are comparable with IDCOR reference plants with respect to severe accident issues. The methodology will be structured to identify unusual system designs or operational situations. The methodology will address accident prevention, containment response, and accident management. The activities leading to acceptance of the methodology include the following:

- Evaluating potential approaches and selecting an acceptable methodology.

- Reviewing the approach with NRC management and obtaining concurrence

- Applying the methodology for the IDCOR reference plants.

- Verifying the methodology as necessary and applying it to three additional plants.

- Developing positions on methodology use and interpretation.

- Presenting results to IDCOR groups.

- Presenting final results to the NRC.

- Preparing an implementation report.

- Briefing utilities on methodology application to individual plants.

Source Term Reduction and Emergency Planning

The 1985 IDCOR effort is focused on the technical work necessary to provide a basis for reducing source terms and to support emergency planning relief. IDCOR established a technical foundation for source terms which is an excellent starting point for pursuing source term reduction. Additionally, in 1985, IDCOR is pursuing resolution of a few remaining issues that can affect the source term. Once the technical bases are established, IDCOR will interact with the NRC to establish the requirements for emergency planning relief which will focus initially on graded response and increased public notification times.

Existing IDCOR results and other available and ongoing work will be integrated with the additional work tasks defined below to establish technically sound source terms. These tasks are scheduled for presentation of IDCOR positions to the NRC staff and the ACRS in late 1985 or early 1986.

The source term program logic includes:

- Documenting the present IDCOR source terms and determining emergency planning relief attainable at present.

- Recommending improvements in source term models, incorporating them into MAAP, and performing analyses of selected sequences.

- Determining further source term reductions required to justify relief in emergency planning.

- Evaluating technical uncertainties and aspects of plant design and operation which affect source terms for IDCOR plants.

- Determining practical improvements which could reduce source terms and documenting the technical basis for source terms.

NCR INTERACTION PROCESS

IDCOR was chartered by the industry to develop the technical basis for resolving the severe accident issues and to be the industry's spokeman with the NRC on these matters. IDCOR and the NRC have met many times to review IDCOR planning, progress, and results. From late 1983 through 1984, IDCOR provided documented technical results of all its work to the NRC. IDCOR and the NRC conducted five multi-day technical exchange meetings to review these IDCOR results. Following this intensive interaction process, early in 1985 the NRC defined 18 remaining open issues. Most of these are either resolved or near resolution. Five or six will likely extend beyond 1985.

The NRC has been conducting a major severe accident research program in parallel with IDCOR. Their program is similar to IDCOR in philosophy and content but is on an extended schedule. The NCR program is funded at a level about 10 to 20 times the IDCOR effort. Many of the major results of the NRC program will be forthcoming in the next few months. IDCOR expects to participate in extensive reviews of the NRC reference plant results, of NUREG-0956 on source term technology, and of other important research products.

The NRC and IDCOR developed precise definitions of the remaining technical issues and identifies the necessary technical work required to address these issues. Further meetings were proposed by the NRC to arrive at a closer technical understanding before developing final technical positions. Also, the NRC requested meetings to present their reference plant results.

IDCOR has the technical work under way to achieve resolution of these remaining open technical issues. The major differences and resolution needs are discussed in the next section IDCOR expects to obtain documented agreement from the NRC management on the resolution of all issues

MAJOR TECHNICAL ISSUES AND PRESCRIPTION FOR RESOLUTION

The many severe accident technical issues originally perceived to be important have been reduced to a tractable few. The IDCOR '85 technical task was directed toward identifying the important remaining issues and an appropriate path to resolution. That work has been completed.

Many issues were resolved in 1984, including containment failure due to in-vessel steam explosion, rate and magnitude of fission product release from fuel in-vessel, resuspension of desposited fission products, and selection of importantly types of sequences. The effort in 1985 has resulted in additional information which should address concerns raised by the NRC in other areas, including treatment of the interaction of tellurium and zirconium, importance of natural circulation in high pressure sequences, fission product and aerosol deposition in reactor coolant systems and containments, direct containment heating, and revaporization of fission products. Essentially no additional effort was required in several additional areas including modeling of emergency response, aerosol production from control materials, revaporization of fission products, and behavior in secondary containments.

In general, progress has been made in providing a technical basis for the few remaining areas of disagreement with the NRC. The more important remaining issues which may extend into 1986 are:

- Hydrogen production (Issue 5)
- Ex-vessel release of fission products (Issue 9)
- Coolability of debris on concrete in the presence of water (Issue 10)
- Hydrogen combustion in ice condenser containments (Issue 17)
- Direct containment heating (Issue 8)
- Containment performance (Issue 15)

The NRC analyses of core relocation and hydrogen production lead to early containment failure in ice condenser transients and in large LOCA sequences in Mark I BWR containments. IDCOR efforts have been directed toward comparison of models with integral experiments and TMI-2 experiences, to the degree possible, and further effort may be necessary. The behavior of core debris interaction with concrete and the related release of fission products is complicated by the dearth of information on chemical forms of low volatile fission products and adequate experimental data under appropriate conditions. This area will probably require additional effort as experimental data becomes available. These areas are treated in detail in the IDCOR analyses and are expected to be the focus of important discussions with the NRC.

GENERIC APPLICABILITY AND INDIVIDUAL PLANT EVALUATIONS

IDCOR analyzed the potential for, and consequences of, severe accidents for the reference plants, Grand Gulf, Peach Bottom, Sequoyah, and Zion. These analyses demonstrated that the probabilities for severe accidents were low and that the releases of fission products to the environment were well below those considered in the Reactor Safety Study (WASH-1400). The IDCOR '85 Program is directed at developing a methodology to determine if these results are generally applicable through individual plant analyses.

IPE methodology concentrates on two major aspects of the accident evaluation: (1) the core damage prevention capability and (2) environmental releases given a severe accident. In this regard, the analysis focuses on the controlling areas for each, such that major outliers in either area can be detected. For this to be executed in a timely manner, the methodology must be an approximate representation of both a Level 1 probabilistic risk assessment. (PRA and a containment response analysis for the dominant sequences as would be performed in a Level 2 PRA.) However, since the specific task of the analysis is to identify major outliers, concentrating on the controlling systems and/or physical processes for the different designs is a sufficient approach.

The IDCOR approach is divided into the two main areas and further subdivided into areas associated with BWR designs and PWR systems. The systems analysis for both designs concentrate on the front line core protection systems and their major support systems such as electrical power and service water. The basis for the structure of the BWR and PWR systems analysis is the extensive work performed on PRAs for both types of designs. Both methods concentrate on system level fault trees and the dependencies between the front line systems and the major support systems as well as the dependencies between support systems. The net result of performing these analyses is an approximate assessment of the core damage frequency which identifies those systems, operator actions, design dependent configurations, etc., which control the order of magnitude of the probability for a severe core damage event.

Assessments of the environmental releases for severe core damage events are based upon the integrated systems analyses carried out for the IDCOR reference plants. In these analyses, specific design features were found to control the ultimate releases to the environment. For example, in a large dry containment, the hold-up within the primary system and in the containment was demonstrated to be a most important aspect of the accident progression. So much so that the other details of the accident sequence had little influence on the ultimate release of the environment. In addition, the analyses for the BWR Mark III design demonstrated that the scrubbing of fission products in the suppression pool was the dominant physical process determining the ultimate releases to the environment. As a result, the specific physical configurations for the different designs are highlighted and designs of similar character are analyzed for a similar capability of fission product retention. In this regard, the specific accident sequences identified for the reactor system must be considered and these are carried out by an integration between the systems analysis and the approximate fission product release evaluations.

This approach to individual plant evaluations has been presented to the NRC staff and has received their tentative endorsement. The methodology for the two elements of these evaluations was completed in July 1985, and reviewed with the NRC staff, the IDCOR Steering and Policy Groups, and also the ACRS. These methods are being applied to the four IDCOR reference plants to provide a validation of the approach. In this effort, the specific interest will be in whether the approximate methodology is sufficient to evaluate the fundamental features of the reference plants. While this test is somewhat circular in character, it does provide for an internal check of the methods before their application to other systems. This will be completed by March 1986.

The IDCOR IPE methodology will be applied to three additional plants, including a BWR Mark II system, a Combustion Engineering plant with a large dry containment, and a B&W NSSS with a large dry containment. This extension of the methodology will provide an example of the implementation for the methods that can be reviewed by the industry (owners' groups and individual plant owners) and will also be presented to the NRC staff. In 1986, the IDCOR Steering Group plans to seek NRC approval of this methodology as an acceptable way to examine existing plants and demonstrate their acceptability with respect to the severe accident issue. IDCOR anticipates NRC approval to be documented in a letter to licensees specifying the requirements for qualifying individual plants.

SOURCE TERM REDUCTION AND EMERGENCY PLANNING

Source terms, based on TID-14844 and WASH-1400, are pervasive in regulatory requirements which affect many aspects of plant design and operation, siting, and emergency planning. A sound technical basis for more realistic source terms is needed to define the benefits of source term reductions in improving emergency planning, or other regulatory areas should the industry or the NRC decide to pursue them.

The tasks being performed in this area was listed above in the section on the IDCOR Program for 1985.

IDCOR's analyses of the four reference plants found several major effects that reduce source terms. These include:

1) Retention of volatile fission products in the primary system due to their release from the fuel and recondensing or settling on cooler surfaces with the primary system.

2) Chemical forms of the fission products, particularly cesium and iodines, the increase their retention because of their low vapor pressures and high solubility in water. Virtually no elemental iodine or cesium are calculated to occur, which is opposite from TID-14844 assumptions.

3) No occurrence of early containment failures from pressurized state. This allows time for fission product laden aerosols to settle on the surfaces. Once on surfaces, material has been shown to remain there in the event of containment depressurization.

4) Retention of fission products by the large amounts of available water within the primary system and containment.

5) Retention of fission products in secondary buildings, primarily by aerosol settling.

As noted earlier, the source terms are lower than previous estimates, including the Reactor Safety Study. Also, releases to the environment, if this occurs at all, generally occur a long time after accident initiation.

Although all themochemical calculations indicate that C_SI and C_SOH would be the dominant chemical species, preliminary (unpublished) experiments performed at Sandia National Laboratories indicate that C_SI may decompose in the presence of stainless steel and radiation and could release elemental iodine. Cesium appears to remain on the surface. We are waiting for the results of confirmatory experiments. Meanwhile, we intend to start preliminary evaluation to determine what influence this effect has on iodine transport in reactor accident sequences.

IDCOR will document the present source terms and identify emergency planning improvements, such as graded response and longer public notification times, that can be derived form them.

Several additional areas are also being investigated further because they could affect present source term values. Among these are:

- Chemical reactions of fission products. (1) Tellurium can react with zirconium and remain with the core debris during pressure vessel melt-through and be released ex-vessel during concrete attack rather than being released at the time of initial fuel melting or be retained in the primary system on surfaces. (2) Lanthanum and other refractories may form oxides during core-concrete interactions that are more volatile than forms assumed by IDCOR.

• Uncertainties in containment failure. Early containment failure and depressurization can cause larger source terms. The NRC calculates greater generation of hydrogen than IDCOR and predicts early failure of ice condenser containments due to hydrogen global burning. IDCOR analyses predict continuous hydrogen burning enabled by natural circulation of air in containment; no early failure is predicted.

• Water pools existing over the debris bed may dry out in certain accident sequences and allow higher fission product release rates. Small scale experimental evidence suggest debris beds may not be quenched when water is added as IDCOR has predicted. However, the NRC has ignored (1) the effects of debris dispersal, which would result in thinner debris beds, (2) the fraction of debris initially participating in concrete attack, and (3) the long times over which the fuel remaining in the vessel, after initial vessel failure, would enter the cavity.

IDCOR will then improve source term models. Two basic areas are being studied that could lower source terms further. First, models are MAAP that control heat transfer from the primary system are being refined, including additional nodalization and radiative heat transfer losses. Second, better knowledge of chemical forms may also reduce the present source terms as well as increase them as discussed above. This is possible because IDCOR ignored the potential for reaction of the volatile fission products with the steel surfaces of the primary system which would form less volatile forms of the fission products. Utilizing this observation would substantially reduce the amount predicted to revolatize and be released through the containment breach.

IDCOR is also studying other means of reducing source terms, primarily through operator actions and plant design. For example, based on the potential release of fission products from debris beds, the operator may reduce releases significantly if he can maintain a pool of water over the debris bed. Actions, such as containment venting, may alter the timing of release and induce transport paths, such as through suppression pools, that enhance aerosol retention. IDCOR anticipates that a number of such means will be identified that will reduce source terms if implemented.

Further desired changes in emergency planning procedures will be assessed to determine if further research on source term reduction would be justified. This would preclude expenditures to support further reductions having little useful impact.

Finally, if so justified, IDCOR will determine further practical improvements which could reduce source terms and will document their technical bases.

SUMMARY

The IDCOR technical program is complete and documented in 48 technical reports and a Technical Summary Report. The results of the IDCOR program show that present generation plants, which comply with existing regulations, can tolerate a broad spectrum of severe accidents and will provide adequate public protection. Thus, major retrofits to designs or regulations to further account for severe accidents are not warranted. However, a few questions remain open; IDCOR and the NRC are pressing toward closure of these questions during 1985 and 1986.

Work is underway to reach the IDCOR objectives added in 1985. The methodology for individual plant evaluations has been developed and is being verified against seven plants. IDCOR is evaluating improvements in source term technology and applying it to emergency planning.

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