JOURNAL OF CIVIL DEFENSE

SEPTEMBER - OCTOBER,
1976
VOL. 9, NO. 5

CONTENTS

NDTA "Man Of Year" Award To Atlanta CD Director

Atlanta's CD Director William E. "Bill" Smith has been selected by the National Defense Transportation Association (NDTA) as Community Transportation Development Man of the Year for 1975-76. The award is to be presented at the NDTA Annual Forum in Boston on September 29th and is based on outstanding civil defense leadership.

UPCOMING

Sep 9-12 — 8th Annual Conf., Upcoming National Assn. of Search and Rescue Coordinators, Cheyenne

Sep 27-28 — International Society on Disaster Medicine Meeting, Geneva, Switzerland

Nov 2-5 — USCDC National Conference, New Orleans

Nov 13 — Annual Conf., Journal of Civil Defense, Starke, Fl.

Mar 13-17 — USCDC Mid-Year Conf., Washington, D.C.

Apr 10-13 — Transfer of Nuclear Technology Conf., Shiraz, Iran

Journal of CIVIL DEFENSE

VOL. 9, NO. 5 SEPTEMBER-OCTOBER, 1976

Sponsored by
The Civil Defense Forum
The Oak Ridge Civil Defense Society
The Professional Society for Protective Design
The Association for Community-Wide Protection from Nuclear Attack

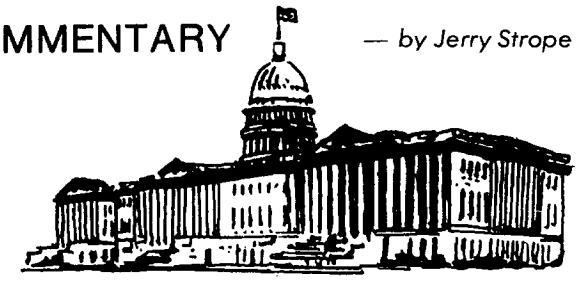
The JOURNAL OF CIVIL DEFENSE is published bimonthly by the Association for Community-Wide Protection from Nuclear Attack. ADDRESS: JOURNAL OF CIVIL DEFENSE, P.O. Box 910, Starke, Fla. 32091. Subscription: $5 per year. Phone (904) 964-5397.

The JOURNAL OF CIVIL DEFENSE presents authentic information relating to civil defense — to the survival of free government, the United States and peace in the nuclear age. Its aim is public education in this field and service as a forum.

Authors are encouraged to submit manuscripts for consideration by the editorial committee for publication (the JOURNAL, as a non-profit organization, pays no fees). Articles, preferably illustrated, should be 500 to 1,200 words in length, slanted to the non-technical reader, and oriented toward the civil defense field. Views expressed in contributions to the JOURNAL are those of the authors and do not necessarily reflect JOURNAL policy.

CAPITAL COMMENTARY

— *by Jerry Strope*



SIFTING THE ASHES

Civil Defense has been a matter of uncommon interest in Washington this election year. For many, it has been a long time coming. It was two full years ago that Congressman Eddie Hébert, then chairman of the House Armed Services Committee, promised to hold "overview" or "oversight" hearings on CD "in the Spring." It didn't happen. Mr. Hébert was toppled from his chairmanship by the freshmen mavericks of the new Congress.

Nevertheless, hopes were kept alive in 1975 by the burgeoning interest of Secretary of Defense James Schlesinger. He not only began to talk seriously about the need for a rejuvenated civil defense effort but also began to budget an increase in funds. But no sooner had he programmed $125 million in Fiscal Year 1977 than he was fired by President Ford. A month later, at the urging of his budget director, James Lynn, the President proposed to dismantle civil defense entirely.

The Lynn budget memorandum posted three threats to the Civil Defense effort, any one of which could portend disaster. First, the budget was reduced to $40 million, within which DCPA would be required to fund the warning and communications systems previously paid for by the Army's Strategic Communications Command. Second, DCPA's personnel strength was to be reduced from the then 650 positions to 270. Since most of DCPA's manpower is in its eight regional offices, they were due to be emasculated. Finally, the budget decision placed an embargo on any use of DCPA funds for planning and training for natural disaster operations, the "bread and butter" operations at the grass-roots. Thus, the stage was set for the hearings by the Leggett Panel earlier this year and the subsequent appropriations and authorization legislation that has now passed both Houses.

Looking back, the intensive review of civil defense issues, which is still going on before Senator Proxmire's Joint Committee on Defense Production, was a satisfying one. And civil defenders can savor the bittersweet fact that, for the first time in history, the Congress has appropriated more for civil defense than the Administration requested. Yet, sifting the ashes of battle, it appears that budgeteer James Lynn, formerly Secretary of DHEW, within which lies the Federal Disaster Assistance Administration, has made most of his position stick.

True, Congress appropriated $82.5 million for the civil defense agency, but that represents a 15 percent cut from this year, considering the requirement to take over the STRATCOM funding. All in all, a far cry from Schlesinger's intended $125 million. And, at least in early August, there is no word that the drastic personnel reduction in DCPA has been rescinded or modified to match the dollars in the appropriation. From personal observation, DCPA is not a "fat" agency. The technical competence of the agency — and civil defense, above all, is a highly technical endeavor — is already overly thin. Among other casualties of the personnel squeeze is likely to be the renowned Staff College at Battle Creek.

Last but not least, the "dual-use" embargo remains. The Administration appears to be unrelenting. For a time, it appeared that Congress would mandate planning for both peacetime and wartime disasters on the DCPA funds that are matched dollar-for-dollar at the local level. Hardly a word was spoken against the practice in the recent hearings. A permissive phrasing was incorporated into a military procurement bill. It passed both Houses with minor differences. Yet, in conference committee, the basic concept was eviscerated. On the Senate floor, the legislative history was precise:

> SENATOR DOMENICI: I have only one additional question. I understand that the authority in the bill refers to emergency assistance and does not direct the Agency to undertake planning and preparation activities for natural disaster? Is that correct?
>
> SENATOR THURMOND: Mr. President, in response to that question, I would say that the Senator is eminently correct. The bill authorizes the use of Defense Civil Preparedness Agency personnel, equipment and facilities in the emergency phases of a natural disaster. There is nothing in the conference agreement which authorizes the Defense Civil Preparedness Agency to preplan for natural disasters. The word "preparation" was omitted purposely in order that the Defense Civil Preparedness Agency would not undertake this responsibility already being carried out by the Federal Disaster Assistance Administration.

It does seem that State and local civil defenders may have won the battles this year but Mr. James Lynn has won the war. □

"If we . . . are prepared for war, then we will not have war. No aggressor will dare tangle with a properly defended America."

COLD TURKEY

BY U.S. CONGRESSMAN

As a nation we detest war. We dislike even contemplating war. And our recent experiences have made us adamantly opposed and acutely sensitive to any suggestion of war adventures.

Yet, fundamental to our existence as a nation is our commitment to defend ourselves. We in the Congress, as major participants in national defense planning, must devote a significant portion of our time and attention to the achievement of a well-balanced, cohesive defense capability. To accomplish this, we must have substantial support from our individual and national constituency for the actions required to bring about an adequate defense posture.

Unfortunately, as people of a peace-loving nation, Americans have a pronounced tendency to shy away from the aggressive, forward-looking approach to war planning that would project a realistic assessment of the future. Instead, our distaste for conflict creates a reluctance to think seriously about the potential horrors of nuclear war — or the equally disturbing thought of our being forced to accept slavery under the threat of such war.

It is all-too-true that nuclear war is "unthinkable" to us as a people. However, there is every reason to know that our major adversary in the world does not find it so unthinkable. Intelligence estimates describe unparalleled civil defense preparations by the Soviet Union. Vast underground factories, and dispersal plans regularly exercised with rehearsals for key segments of the population, are but two elements of the massive Soviet program.

In the midst of our present debate over the meaning and intent behind Russia's continuing military buildup, we have become so entangled in the potentials and complexities of sophisticated weaponry and the pros and cons of various possible strategies, we have completely lost sight of one vital truth: a successful war effort depends as much on the effectiveness of a nation's defenses and its ability to continue industrial production at a high level, as it does on the nation's arsenal of offensive weapons.

Recognizing that the entire United States would occupy a central part of any nuclear battlefield, what have we done? We have repeatedly committed ourselves to a policy outlawing our "first use" of nuclear weapons. Such a policy, of course, demands that we establish strong, in-depth defenses to protect our ability to strike back.

Then, as though oblivious of this fact, we took the ABM (antiballistic missile), our most promising system for intercepting and destroying incoming nuclear weapons — a system with absolutely no offensive potentials — and proceeded to paint it as a villianous, immoral and peace-threatening scheme to promote aggression. Having self-propagandized ourselves into this delusion, we buried the system — lock, stock and barrel.

Aggression indeed! The ABM could not penetrate enemy territory. It could not kill or maim one enemy soldier or civilian. It could only defend Americans in America.

Then, in what would have been a final, fail-safe

measure to prevent any semblance of an adequate program, our civil defense was budgeted for disaster. With $100 billion dollars in our military budget, only $71 million was proposed for defense of our cities and our people. In contrast, Soviet civil defense expenditures — well-hidden in the annual budgets of their armed forces — have been estimated in excess of *one billion dollars* since 1972.

Our approach to national survival was neither balanced nor coherent. It wasn't even acceptably intelligent. It was a program for national suicide.

It was at this point that I jumped into the civil defense debate to insist that its budget not be emasculated.

As legislative issues go — civil defense is difficult. It will not create a surge in the job market; it is not an important economic spur to recovery. There are no multi-billion dollar contracts; nor can we claim that a vigorous civil defense program will correct any of our social ills. Civil defense isn't glamorous — it is just life-and-death essential.

It is time we came to our senses. It is also time our elected representatives, who are charged with the welfare and safety of our nation, forget about political expediency and think in terms of what we must do to guarantee a free America and the preservation of our society.

If we detest war and turn our backs on it, as we are doing, then we will invite war and have war.

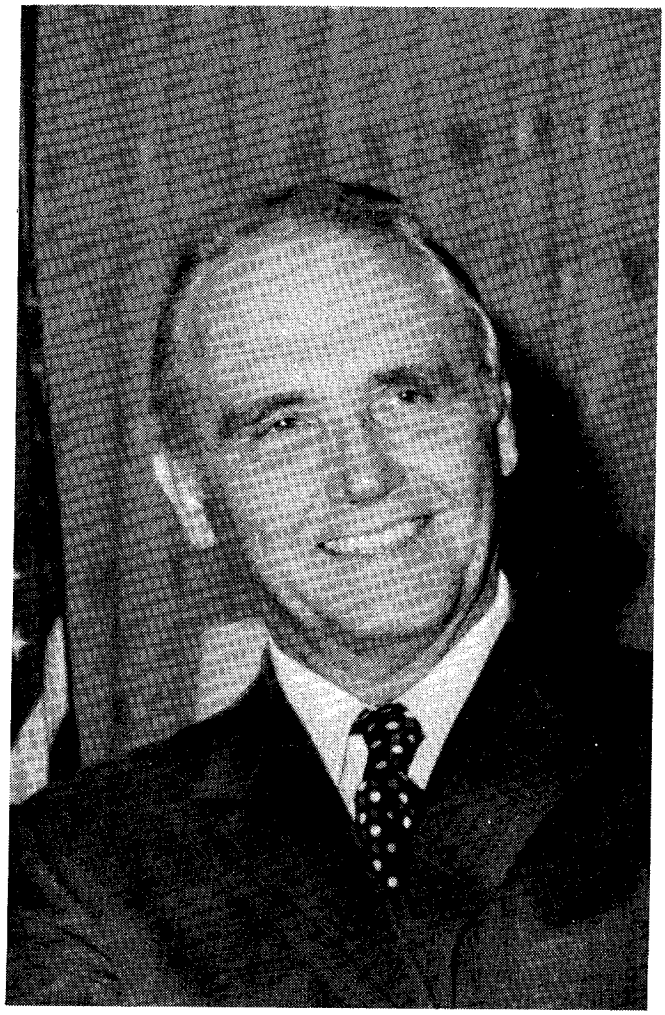
If we detest war — if we *really* detest war — and are *prepared* for war, then we will not have war. No aggressor will dare tangle with a properly defended America.

With the help of civil defense professionals and farsighted citizens we have recently been successful in preventing the sabotage of the civil defense budget.

But now we must do more. We must reestablish the $110 million civil defense budget wisely proposed by the House Armed Services subcommittee after a conscientious study of civil defense requirements. I am working hard to see that this is done.

And if we have our sights aligned on a truly practical plan for survival and for peace and for self-respect in the world of today, we must increase this budget substantially for 1978. And even more later. We can do all this without an overall national budget increase simply by shaving some of the fat from our monumental give-away burdens.

There's one particularly sensitive item if we want to be "practical" about this — if we really are to succeed: we need to pull together. Those who embrace a tough home defense program in our states and counties and cities and rural districts must support us in Congress who are fighting to attain it, must let their elected representatives know precisely how they feel, must contact these representatives at every opportune moment, must convince them that the people back home *want* home defense, *want* a practical, farsighted, vigorous, ongoing civil defense program, *want* a civil defense budget that will support such a program, *want* this great assurance of peace through preparedness. Only in this way will we succeed.



BILL CHAPPELL

". . . perhaps the time has come when this country will stop playing the most dangerous kind of Russian roulette . . . "

SURVIVING A NUCLEAR WAR

—INSIDE REPORT by Rowland Evans
and Robert Novak,
Courtesy of Field Newspaper Syndicate

With "detente" now stricken from the administration's lexicon and Congress unwilling to challenge President Ford's record-high defense program, this country's increasing danger on the civil defense front is under belated attack from an unlikely combination of hawks and doves.

What is astonishing is that defense of the homeland against possible nuclear attack -- "thinking the unthinkable," in the words of former Secretary of Defense James Schlesinger -- has been a virtual no-no topic of serious political debate for 15 years.

But this stark warning from a dovish House Armed Services Committee panel signals belated change:

"The panel received truly alarming estimates . . . about the comparative casualties in the event of nuclear attack if the Soviets had evacuated their people during the crisis period and we were unable to do so. The Soviets would lose about 10½ million people; the United States would lose about 90 million people.

The chairman of that three-man panel is Democratic Rep. Robert L. Leggett of California, a moderate dove. Also on the panel is moderate Republican Donald Mitchell of New York and one of the most dovish freshman Democrats in the House, Rep. Robert Carr of Michigan. Their unanimous recommendation: that the miserly $71 million civil defense program be increased to $110 million at once.

Even such an increase would not come close to the long-time Soviet spending level on civil defense, which the panel estimated at $1 billion a year. Before he was fired as Defense Secretary, Schlesinger was deeply worried over the low level of civil defense preparedness in this country, for a fundamental and frightening reason: Soviet ability to "survive" — and U.S. ability not to survive — a nuclear exchange with an enemy.

Soviet survival is based on rapid evacuation of the cities, on vast subterranean fallout shelters in the evacuated areas and on war plants capable of continuing operations after a nuclear exchange by virtue of "hardened" sites or geographic dispersal in remote areas.

Lacking even skeleton programs for these "war-survival" measures (often called passive defense), the U.S. could find itself prohibitively out-psyched if deadlock between Moscow and Washington became the prelude to a possible nuclear exchange. Rather than risk such an exchange from a position of proven inferiority in terms of the ability to withstand it, the U.S. might be forced to yield.

Indeed, ability to absorb a nuclear attack and continue as a nation is regarded by some experts as only marginally less important than possession of rough "equivalence" in nuclear striking force. That is why a Soviet diplomatic agent — openly and above board — attended all 11 sessions of the Leggett panel. What the U.S. does in civil defense is of paramount importance to Moscow.

The heart of the panel's report warned that "the size and the reach of the Soviet effort, coupled with its aggressive buildup of arms, raise profound questions about the appropriate defensive counter-actions to be taken by the United States."

That conclusion fits a totally separate warning by former ambassador to the Soviet Union Foy D. Kohler, now a professor at the School for Advanced International Study at Miami University; a hard-line hawk, Kohler, who ran the U.S. embassy in Moscow from 1962 to 1966, states in the foreword to a just-published book ("War Survival in Soviet Strategy," by Dr. Leon Goure, published by Miami University):

"The Soviet Union has stepped up in very substantial ways its war-survival program since the advent of the detente relationship with the U.S. in May, 1972, and is today steadily increasing its attention and resource allocations to the program."

To Kohler, the essential and dangerous difference between American and Soviet response to the terrifying possibility of nuclear war is that Americans really believe no exchange will ever occur, because neither nation will risk its own destruction; but the Soviets "have never accepted the 'overkill' concept or the concept of 'mutual assured destruction' . . . the Soviet emphasis has rather been on survivability and indeed on the possibility of victory in nuclear war."

With knowledgeable hawks like Schlesinger and Kohler and dovish Democrat's like Carr and Leggett in basic agreement, perhaps the time has come when this country will stop playing the most dangerous kind of Russian roulette with a totally unpredictable future.

Editorial postscript:

The Evans-Novak report is part of a press awakening to a gaping unpreparedness on the American home front. Samples of other "Oversight" reactions:

American Legion Commander Harry G. Wiles in *The American Legion Magazine:*

"In a hazardous, unpredicatble world, man cannot afford to discard weapons for his safety.

"Civil defense is such a weapon. A nation trained and equipped to survive a nuclear war has a better chance of preventing such a catastrophe. Therefore, we in The American Legion must protest proposed civil defense cuts . . . "

Holmes Alexander in *Today:*

"The Soviet leadership believes that its civil defense measures give the USSR a distinct advantage with respect to risk taking in the nuclear age and to improve its chances of not only surviving but winning a nuclear war should it come . . .

"If America is to maintain independence against Soviet weapons and threats, we must have government programs to dig and disperse. We are far behind the Soviets in these activities."

James W. Phelps in syndicated column "Today's Logic":

"If one nation wanted to destroy another in this modern world of nuclear power, the best way would be (1) to get it to agree not to defend itself with antiballistic missiles. (2) to build up one's own supply of ICBMs, and (3) to overwhelm its enemy by a preemptive first strike . . .

"Russia has an elaborate system of evacuation. She has regularly and repeatedly instructed her citizens on evacuation procedures. She spends more than thirty times as much money on civil defense as we do."

Matthew B. Ridgeway (former Supreme Commander of Allied Powers in Europe, Supreme Allied Commander in the Far East, and Army Chief of Staff) in *The New York Times:*

"Why have we dismantled the single operational anti-ballistic missile base we had built at such great cost? . . .

"Why are we so reluctant to face the need for rational Civil Defense planning and implementation?

". . . lulled into complacency and apathy, are we content to accept the risks — already on the threshold of a national menace to our survival, as the former Defense Secretary James R. Schlesinger has publicly stated -- too reluctant to plan, too irresolute to act, too unwilling to accept the sacrifices that the situation demands, sacrifices that can only greatly increase in severity the longer they are postponed?"

And from the magazine *Army:*

It isn't that the citizen is opposed to civil defense — it's more likely that he really doesn't care much one way or the other."

ACHILLES' HEEL?

Eight years ago Walter Cronkite in the introduction to the book *Who Speaks for Civil Defense* wrote: "If there are enough of us left after the nuclear war to carry on our government, one can safely forecast that the first order of business of the first post-war Congress will be the gosh-darndest investigation this nation has ever witnessed. Subject? What Ever Happened to Civil Defense?"

Can the fresh flush of interest in 1976 translate into a sensible homeland protection solution, or are we still to contemplate the prospect of ignoring it and — like a missing lifeboat — finding it not there when it is needed for survival?

The base has now been laid for a national civil defense dialogue. It's pursuit *could mean* a realistic approach to the problem of defending our people. Will it? □

REACTOR ANATOMY — III (Third of a Four-Part Series)

WHY SO MANY REACTOR DESIGNS?

— *Carsten M. Haaland*

Emergency Technology Section
Health Physics Division
Oak Ridge National Laboratory

A glance at the listing of the world's reactors (Table 1) may leave the average reader with a mouthful of unpalatable alphabet soup. According to the list, there are twelve different major types of reactors either operating or in the planning stage throughout the world. Three other important reactor concepts, not listed in Table 1, which are in various stages of research and development are the GCFR (Gas-Cooled Fast Breeder Reactor), the LWBR (Light Water Breeder Reactor), and the MSBR (Molten Salt Breeder Reactor).

What do these names mean, and why are there so many?

In order to answer these questions, it may be helpful to consider the automobile as an analogy. Many readers may recall when a Chevrolet or a Ford automobile was not called an Impala or a Galaxy or whatever, but simply a Chevrolet V-8 or a Ford V-8. The "V-8" indicated to most people that the engine had eight cylinders which were arranged in the form of the letter "V". In the reactor business, the name of the developer or manufacturer is usually not associated with the name of the product, as it has been in the automobile industry. However, analogous with the "V-8" designation, the letters in the name of the reactor indicate something about the design of the reactor, usually indicating how the reactor core is cooled and/or how the neutrons are moderated (slowed down). For example, the PWR (Pressurized Water Reactor), uses water to cool the core, and this water is pressurized so it won't boil even at the high temperatures it reaches. The BWR (Boiling Water Reactor) also uses water to cool the core, but the water is allowed to boil in the core region and produce steam directly.

With regard to the number of designs, consider that an automobile may be designed with an engine having 4, 6, 8 or more cylinders, and these may be

Table 1. Power Reactors of the World *

Type	Name	Number in World Outside USA		Number in USA	
		Operating	Planned	Operating	Planned
AGR	Advanced Gas-Cooled Reactor	1	10	0	0
BWR	Boiling Water Reactor	18	38	20	52
GCHWR	Gas-Cooled Heavy-Water-Moderated Reactor	3	0	0	0
GCR	Gas-Cooled Reactor	36	0	0	0
HTGR	High-Temperature Gas-Cooled Reactor* *	0	0	0	5
HWLWR	Heavy-Water-Moderated, Boiling Light-Water-Cooled Reactor	1	0	0	0
LGR	Light-Water Cooled, Graphite-Moderated Reactor	3	4	1	0
LMFBR	Liquid Metal Fast Breeder Reactor	2	4	0	1
LWCHW	Light-Water Cooled, Heavy-Water-Moderated Reactor	0	2	0	0
PHWR	Pressurized Heavy-Water-Moderated and Cooled Reactor	9	16	0	0
PWR	Pressurized Water Reactor	24	87	28	112
THTR	Thorium High-Temperature Reactor	0	1	0	0
		97	162	49	170

* Source: "World List of Nuclear Power Plants," Nuclear News, Vol. 18, No. 7, pp. 63-75, August 1975.

* * Plans for construction of these reactors have been suspended since the publication of this table in Nuclear News.

Table 2. Possible Alternatives in Designing Power Reactors.
The final reactor designs will incorporate one choice from each of the six columns

Fuel	Fertile Material*	Moderator	Coolant	Neutron Velocity	Geometry
Natural uranium	TH-232	Light water	Gas (CO_2, HE)	Fast	Heterogeneous
U-235	U-238	Heavy water	Light water	Intermediate	Homogeneous
U-233	None	Graphite	Heavy water	Thermal	
PU-239		Terphenyl	Liquid metal		
		None	Hydrocarbons		

* Fertile material is not itself fissionable by thermal neutrons but can be converted into a fissionable material by irradiation in a reactor. The two basic fertile materials, U-238 and Th-232 (thorium), can be partly converted into fissionable Pu-239 (plutonium) and U-233, respectively, by exposure to neutrons in the reactor.

arranged in different ways, in line or in a V-8 pattern; for example, the engine may burn diesel or gasoline and may be cooled by air or by water. Furthermore, the automobile may have an automatic transmission or a straight-shift, and it may use front or rear wheel drive. With all these options, among others, a seemingly endless variety of automobile designs is possible and, indeed, hundreds of different designs have been produced, some of which have been commercially successful.

Similarly, a reactor may be designed to use various combinations of fuel, coolant, and moderator. In addition, the geometry may be heterogeneous (fissionable material and moderator arranged to present a nonhomogeneous medium to the neutrons) or homogeneous. The main elements involved in the design of a reactor are listed in Table 2. Because a reactor designer has the option of choosing any one element from each of the columns listed in Table 2, he has, according to this listing, 1800 combinations from which to select. The selection of a design is not as hopeless as it may seem, because the use of certain elements is dictated by such things as the availability of fuel, capital costs, and safety considerations. It is inevitable that some reactor designs will be more successful in terms of maintenance-free performance, cost of operation, and power-producing capacity than other designs. Due to the complexity of the reactor design and changing world conditions affecting factors such as fuel availability, cost of materials, power demand, and waste management, it is impossible to design one power reactor which will be the best for all possible conditions for all time. Through the experience of designing, building, operating, and analyzing the performance of different designs, it is to be expected that future reactors will be designed to cost less per megawatt of electricity delivered, and they may be inherently safer and simpler to operate. Analogously, automobiles of today are inherently safer and simpler to operate than automobiles of fifty years ago, as a result of a process of trial-and-error and survival-of-the-fittest designs extending through the production of over 275 million units since 1900. A nuclear power reactor is much more complex than an automobile, costs several hundred thousand times more, and may never become a mass-production item. Consequently, before a particular type of power reactor is constructed, the design is exhaustively analyzed, and one or more prototypes are constructed, operated, and analyzed, involving hundreds of thousands of engineering man-hours.

Two reactor types dominate the current power reactor scene, mainly because they were among the first which were developed for widespread commercial application. The PWR was developed and promoted by Westinghouse, growing out of the nuclear submarine program, and the BWR by General Electric. These are sometimes called LWR's (Light Water Reactors) to distinguish them from those which use heavy water to moderate the neutrons. According to Table 1, 90 out of 146, or 62% of the operating power reactors of the world were LWRs, as of August 1975, and at that time 298 additional LWRs were planned for construction.

Light water is ordinary water composed of H_2O molecules. Heavy water contains a high fraction of D_2O molecules, i.e., deuteriumoxide molecules in which the hydrogen atoms of ordinary water are replaced by deuterium atoms which are approximately twice as heavy as the hydrogen atoms. The great virtue of heavy water as a neutron moderator is that neutrons are absorbed by it only 1/600th as much as by ordinary water. Because of this property, more neutrons survive after being slowed down and are available for interaction with the fissionable material. This property makes it possible for reactors to operate with natural uranium, a capability which is highly important for smaller nations which cannot afford or do not wish to develop a uranium enrichment facility. It was primarily for this reason that the Canadians devloped the "CANDU" PHWR (Pressurized Heavy-Water-Moderated and Cooled Reactor) (McIntyre, 1975), even though heavy water is fairly expensive (about $50 per pound).

In spite of the complexity and recent appearance of nuclear power reactors, they outperform their oil- and coal-fired counterparts. Although only 9% of all electricity generated in the United States in 1975 was provided by nuclear power, over $2 billion was saved by using nuclear power rather than fossil fuels (*Nuclear News*, 1976). The average total cost to the utility companies of a kilowatt-hour produced by nuclear energy in 1975 was 12.27 mills, compared with 33.45 mills for oil and 17.54 mills for coal. Further-

more, the capacity factor (percent of rated capacity actually used) was 64.4% for nuclear, as compared with 42.5% for oil and 54.8% for coal. The reliability of nuclear plants, often distorted by nuclear critics, continues to be competitive with fossil plants, as shown by analysis of actual operating statistics. This superior performance is obtained even though nuclear power has been with us only a couple of decades, as compared with almost ten decades for the fossil-fueled counterparts. As more experience is obtained with the various designs of nuclear power reactors, it is to be expected that greater safety, efficiency, and reliability will be obtained which will increase their existing margin of superiority over fossil-fueled power plants.

Of all the power reactors in the world, as listed in Table 1, there are only two operating breeder reactors, the LMFBRs, one in France and one in the Soviet Union. These reactors are especially significant in considerations of future energy sources for the world because they are able to make useful fuel from the 99.3% of uranium ore, the U-238 component, which is not used in nonbreeder reactors. By breeding plutonium from U-238, the breeder reactors are capable of extracting over a hundred times more energy per pound of uranium ore than the nonbreeders. If all the reactors planned for the future were of the nonbreeding type, the world resources of good quality uranium ore would be exhausted possibly within a few decades and certainly within a century or two. Incidentally, the word "fast" in LMFBR does not mean that breeding takes place rapidly, but that the average velocity of the neutrons is fast compared with that of neutrons in other types of reactors.

The next and final article in this series (in the Journal's January-February 1977 issue) will discuss reactor safety, waste disposal problems, and prospects for competitive power from other sources. □

REFERENCES

[1]Hugh C. McIntyre, "Natural-Uranium Heavy-Water Reactors," Scientific American, Vol. 233, No. 4, October 1975.

"Over $2 Billion Saved by Nuclear in '75-AID," Nuclear News, Vol. 19, No. 7, p. 41, May 1976.

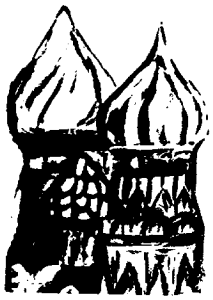
ADDITIONAL READING

The booklets listed below may be obtained at nominal cost from

United States Energy Research and Development Administration
Technical Information Center
Oak Ridge, TN 37830

IB-006 Nuclear Terms: A Glossary
IB-014 Worlds Within Worlds: The Story of Nuclear Energy, Volume 1
IB-015 Worlds Within Worlds: The Story of Nuclear Energy, Volume 2
IB-016 Worlds Within Worlds: The Story of Nuclear Energy, Volume 3
IB-501 Atomic Fuel
IB-502 Atomic Power Safety
IB-505 Nuclear Power Plants
IB-507 Nuclear Reactors
IB-508 Radioactive Wastes
IB-511 Sources of Nuclear Fuel
IB-513 Breeder Reactors

OVER THE IRON CURTAIN



— Ruby N. Thurmer

In late November 1975, a cyclone struck the northwestern part of the Black Sea coast. Odessa (population 941,000) was hit by hurricane-force winds, snow, and icing. The city was without lights and water. The entire population of the city was mobilized to combat the calamity. At the head of the emergency operations was the Civil Defense organization of the city — around 8,000 CD personnel were actively engaged in directing all phases of restoring necessary services. Emergency power was supplied to essential enterprises from ships in port and from trains, and water was supplied to vitally important installations by expedient means. It was a serious testing for all the CD services, and they met it honorably.(1)

A 2-day Civil Defense training session was held at Vil'nyus, Lithuanian S.S.R., on November 24-25, 1975.(2) This course was for leading and command personnel, representatives of all civil defense headquarters, and secretaries of party organizations. The purpose was to work out plans for the complex training of the people which has been stipulated in the 1976 training-year plans.

A demonstration CD exercise was held at a clothing factory in order to show the attendees how the plant could quickly assume an emergency mode of operation. The employees successfully executed a wide range of civil defense tasks, including:

1. Making "anti-dust tissue masks" for all personnel,
2. Responding to CD signals,
3. Taking shelter,
4. Using gas masks in a smoke-filled atmosphere,
5. Evacuating, on foot, to a zone outside the city,
6. Sheltering of CD personnel and equipment,
7. Performing reconnaissance work,
8. Performing rescue missions,
9. Fighting fires, and
10. Rendering medical aid to the "injured,"

(1) Moscow Sovetskiy Patriot in Russian, 5 Dec 75

(2) Vil'nyus Domestic Service in Russian, 1230 GMT, 12 Dec 75 ("Civil Defense" Program: Talk by Nikolay F. Kazokov, assistant head of the Vil'nyus civil defense staff -- recorded.)

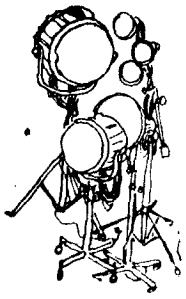
REACTOR MATERIALS AVAILABLE TO PUBLIC:

The Los Angeles Office of the American Nuclear Society anounces the availability of the following materials:

NUCLEAR ISSUES INFORMATION. FREE — 3 one-page explanations of Nuclear Waste Disposal, Nuclear Insurance and Emergency Core Cooling Systems. These are the issues in the nuclear initiatives in various States.

$5 — Nuclear Specialists Information Kit, includes the $4 ANS Question and Answer Book (122 pages).

Write: Los Angeles Section of American Nuclear Society, Box 5283, Hacienda Heights, Ca. 91745. (Offer limited)



SPOTLIGHT

CD "DEBATE" IN *PHYSICS TODAY*

The April issue of *Physics Today* featured "Civil defense in limited war — a debate." Arthur A. Broyles and Eugene P. Wigner covered the pro-civil defense side of the question while Sidney D. Drell handled the opposition. Over 8 pages were devoted to the subject. Broyles and Wigner ended their argument by saying:

> "As a final remark we wish to add that it disturbs us greatly that passionate opponents of the protection of our own civilians against nuclear attack do not oppose, and do not even mention, the elaborate preparations of the USSR in this direction. . . . If the opponents of civil defense feel that these preparations are not even worth mentioning, why do they consider the protection of our own civilians objectionable and even provocative?"

TRIAL BY TELEVISION

In Issue No. 9 of *International Summary* General Sir Walter Walker says:

"The point has been made often enough that the American engagement in Southeast Asia did not fail in the rice-fields of Vietnam so much as on television screens of American homes . . .

"In Vietnam an over-sophisticated American army and air force which dropped four times more bombs than they did in the whole of World War II, failed to win a limited guerilla war against pŭny men of a puny nation.

"That phony and infamous 'peace with honor' — which earned a Nobel Peace Prize — amounted to nothing more than a fig leaf to cover a scuttle . . .

"It is easy to see why the Soviets wanted to keep the war going. While America spent $150 billion on weapons that are now down the drain in Vietnam, the Soviets spent an equivalent amount on nuclear weapons to control the world.

". . . there can be little doubt that television coverage of the Vietnam War was largely responsible for sapping the moral fibre of the American people to *continue* to struggle."

CONFIDENTIALLY . . . .

A *Christian Science Monitor* report from Peking reveals that Australian Prime Minister Malcolm Fraser privately told Chinese Premier Hua Kuofeng he had serious doubts as to the will and the ability of the United States to face up to growing Soviet strength.

Members of Mr. Fraser's entourage mistakenly gave the information to the press.

Fraser also said:

"Because of the attitude of the United States, Cuba has not found it very easy to be successful in an environment that is close to the United States, but with Soviet support found no difficulty in causing very grave problems in Angola. We wonder whether or not Vietnam might follow the same path that Cuba has. We raise that as a question."

JOURNAL OF CIVIL DEFENSE

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NEXT ISSUE:

- Ruby Thurmer analyzes the current bleak Soviet agricultural picture, grain purchases and use of grain for strategic storage.