

direct support for the racialist and colonialist oppression of the peoples of South Africa and Namibia; it threatens the independence of American States and it is at the same time directed against the national liberation movements of the peoples of Zimbabwe, Angola, Mozambique and Guineabissao. Thus, it also endangers peace and security in the world.

But in spite of these policies of imperialism, national liberation movements continue to grow in tempo and sweep. In spite of the American conspiracies in Cuba, barely 150 kilometres from the US coast, it continues stoutly and firmly to carry aloft the banner of socialist revolution. Latin America, in the vanguard of anti-imperialism, is further slipping away from the clutches of Washington, in spite of the ten years of 'alliance for progress'. In Vietnam, in Middle East the plans of US imperialism are being frustrated. The Vietnam war has led to a sharp division inside the American nation. The recent revelations made by the American papers about the conduct of the Vietnam war has put American imperialism in the dock as the worst criminal before the people of the world.

17 29½ hrs.

[SHRI SRZHIYAN in the Chair]

MR. CHAIRMAN: Mr. Gopalan will continue his speech on the next day. Now, we will take up Half-an-Hour discussion.

17.30 hrs.

HALF AN HOUR DISCUSSION RE. TEST BREEDER REACTOR

SHRI SAMAR GUHA (Contai): Sir, on 25th July last year the Government announced that our Atomic Energy Commission is interested in studying the situation of peaceful explosion and in reply to my question also they have almost given the same answer.

Sir, there is no marked change in the attitude of the Government even after twelve months. But I am glad to know that they have already completed the design of having

a bigger test reactor. They are going to start making it. I would like to know from the Government when the Kalpakkam reactor is going to be completed and whether it will be possible for the Government to complete it before 1974. I also want to know from the Government because India has immense resources of thorium and thorium can be used to make U 233, another fissile material, and which if you can use it and utilise it for the purpose of using as a nuclear isotopes for our reactor also for the purpose of peaceful nuclear explosion that will not only help us to obviate our difficulty in regard to nuclear explosion but it will be helpful for us to be independent of obligation of world powers in supplying nuclear isotopes for our reactor.

Out of these two questions I want to know from the Government how long they will continue to study this situation of having peaceful nuclear explosion, underground nuclear explosion before this nuclear explosion or nuclear energy is used for nuclear engineering purpose like exploration of oil or converting the desert into a fertile land. It is obvious unless we make some preliminary experiments it is not possible to apply this nuclear energy for nuclear engineering purposes. I want to know from the Government what steps the Government have taken in regard to making certain preliminary tests for achieving that end and also to muster the technology of applying nuclear energy for oil exploration and other purposes.

It is known to us and to the world that India does not lack in the know-how and technology about nuclear blasts. India has produced nuclear fuels also. We do so not lack in the possession of fuel for under taking this preliminary test on nuclear blast or nuclear explosion or mustering the technology of nuclear engineering. But we have been told that although India possess nuclear fuel unfortunately India does not own that nuclear fuel. Because according to our contract with Canada, we are not free to use the nuclear fuel that we have from our reactors for any blast or explosion purposes.

I want to know from the Government whether it is a fact that when this contract was entered into with Canada in 1954, the concept of peaceful nuclear explosion was not there. Except for the utilisation of nuclear isotopes

[Shri Samar Guha]

for agriculture and other purposes, the idea that nuclear energy can be used for peaceful purposes like development of nuclear engineering was not there. It is only in the last 10 or 15 years that the idea of nuclear engineering technology has developed. The contract we entered into with Canada, I think, does not hold good, because we are not going to use, according to our Government announcement, this fuel for nuclear explosion for making nuclear weapons.

Recently in other countries also they have raised the same point that if they use nuclear fuel for the purpose of peaceful explosion, the prohibition of using nuclear fuel does not stand in the way of having preliminary experiments in blast technology. I want the Government to argue with Canada that though for technical or contractual reasons we do not own the fuel that we possess, we can own it and use it for peaceful explosion purposes.

Then, in this House and also outside we are trying to impress upon the Government that unless we develop the tactical nuclear weapons, it will be impossible for us to defend ourselves from the potential Chinese threat. Today the Government has come out with a report that China can produce every year 40 nuclear bombs and has a stockpile of 150 nuclear bombs. They have some thermonuclear bombs also and have devised long range missiles also.

I want to differentiate between tactical nuclear weapons and strategic nuclear weapons. Strategic nuclear weapons mean thermonuclear weapons. They also require development of long range missiles for the purpose of delivery of those thermonuclear weapons.

It is now a known fact that atom bombs or mere nuclear bombs are no longer considered enough. Almost all the big powers—USA, Russia, UK, France—have developed the tactical nuclear weaponry to strengthen their conventional arms. The NATO powers have a number of tactical nuclear weapons which have strengthened their conventional armies posted in Europe. Recently Japan has published a white paper in which it has argued that their contract or pact with the USA does not stand in the way of their developing tactical nuclear weapons for strengthening their conventional arms.

If China, which possesses 150 nuclear bombs leave aside thermonuclear bombs—in a tactical manoeuvre or even in a limited war with us, uses any one of those tactical nuclear bombs in any of the Himalayan passes, what will happen to our army? What does a tactical nuclear bomb, a nuclear mortar or a nuclear cannon mean? It means, at least 20 kilotons. There are nowadays some which can also be made with lesser amount of nuclear fuel. The first bomb that was dropped on Hiroshima was also a 20 kiloton bomb. It killed 150,000 people. In Nagasaki the number was 75,000 because Nagasaki is a terraneous city.

Suppose China uses this tactical nuclear weapon as a conventional weapon. What will happen? Our Himalayan passes, our Himalayan fortification, our so many divisions of army, will be completely blasted before the world knows about the use of tactical nuclear weapon. Therefore, I would urge upon the Government to revise their attitude about developing tactical nuclear weaponry if they really want to match or to face the Chinese nuclear threat against India.

I also want to draw the attention of the Government that Israel, a country of only 25 lakhs people, has developed tactical nuclear weapon; South Africa has also developed tactical nuclear weapons and Germany under the umbrella of NATO has almost completed it, and only the finishing touch is given by the NATO powers to develop tactical nuclear weapons.

No doubt, there is a distinction between tactical and strategic nuclear weapons. I have no doubt that if any power either China or USA or USSR uses thermo-nuclear weapons either straightway or with the help of any longrange missile, inter-continental ballistic or anything, the world will know about it. But if any Power, in a limited way, used a tactical nuclear weapon, tactical nuclear mortar, tactical nuclear cannon, they can create a devastation before the world knows about it and before it turns into a global conflagration.

Our Government must know there is a distinction between strategic nuclear weapon and tactical nuclear weapon. Tactical nuclear weapon can be used for limited purposes, in a

limited sphere of war, before the world conscience is aroused or the world powers are brought into vortex of warfare. Therefore, if our Government really wants to face the threat of China, the menace of nuclear weapons of China, it is time that our Government should embark on the project of making tactical nuclear weapons. That is the reason why I am very much worried that this Test Breeder Reactor should be completed quickly and our thorium resources should be utilised for making U-233 so that we can be self-sufficient.

As regard nuclear weapons, we have the know-how technology. We have developed it. Thanks to Dr. Vikram Sarabhai. Thanks to other scientists who are working on it. Really, we feel proud of our scientists working in the Atomic Energy Commission. They have done a lot. The whole world has praise for them. But it is the Government who have to undertake the policy and decide their policy. Our scientist will be able to do the job. I want to know whether the Canadian contract stands in the way of using nuclear energy for our preliminary test blast for peaceful purposes, whether it stands in the way of utilising the fuel that we possess when, technically, we do not own them. Let the Government let Mr. Gokhale argue the case that 1954 Agreement does not stand in the way. The whole context of the Agreement, the whole concept of the nuclear explosion has undergone radical change. Nuclear explosion is now used for peaceful purposes and India can use nuclear energy, whether for peaceful purposes or for making tactical nuclear weapons. The key point is the preliminary test of nuclear blast, whether we can use for constructive purpose or destructive purpose, for war purpose or for peaceful purpose.

Firstly, the Government should look into the contract between India and Canada and see whether that contract can be abrogated and secondly, whether our thorium resources can be used quickly for making U-233 and be self-sufficient in the nuclear field so that we can use it either for peaceful purposes or for making tactical nuclear weapons.

SHRI N. SREEKANTAN NAIR (Quilon) : May I ask a question, Sir ?

MR. CHAIRMAN : Those who want to put a question should have given their names before the commencement of the sitting. That

is the rule.

SHRI S. M. BANERJEE (Kanpur) : That is the rule. But, because nobody has given the name and because unless one hears the speech, one cannot follow and only we have followed him, so we should be allowed to put questions. As an exceptional case, please give us chance to two or three people to put questions.

MR. CHAIRMAN : I am sorry, I cannot make a departure. Previously, that was the position. Now, the amended rule says that a Member who wants to ask a question, should make a request in writing before the commencement of the sitting at which the discussion is to take place. Nobody has given his name. Therefore, nobody is entitled to ask questions. The Minister will now reply.

SHRI S. M. BANERJEE : We only wanted to make it clear to the world that it is not the policy of all Parties in this country to have a nuclear arsenal set up. We believe more in solving unemployment, etc. Vietnam has been fighting American imperialism....

MR. CHAIRMAN : That is not the question.

SHRI N. SREEKANTAN NAIR : The Chair can make a deviation in certain cases.

MR. CHAIRMAN : The Rules do not give any discretion to the Chair in allowing a Member to put a question because it clearly says that he shall make request in writing before the commencement of the sitting.

SHRI N. SREEKANTAN NAIR : It is only in regard to the Member, not the Chair. The Chair has got the inherent power.

SHRI SAMAR GUHA : My friend, Mr. Banerjee, has only betrayed his ignorance. In so far as the conventional weapons are used, the nuclear tactical weapon is less costly and is more effective in having a bigger fire power.

SHRI S. M. BANERJEE : I don't know that all he says can be taken seriously because he is not an atomic expert.

MR. CHAIRMAN : You can settle your knowledge outside the House.

SHRI SAMAR GUHA : I will present a book to Mr. Banerjee. He will know about the ABC of atomic energy.

SHRI N. SREEKANTAN NAIR : Sir, this is a very important subject. The word 'shall' is concerned only with the Member and not the Chair.

MR. CHAIRMAN : I cannot use the discretion at this stage. When the demands for the Ministry come up, you can make your plea very effectively.

SHRI N. SREEKANTAN NAIR : They may not come up at all. They may be gillotined.

THE MINISTER OF STATE IN THE MINISTRY OF HOME AFFAIRS (SHRI K. C. PANT) : Sir, the House knows, my hon. friend, Mr. Samar Guha, expresses a consistent interest in the subject of nuclear energy. In January last year he has initiated two debates. There was a half-an-hour discussion on the question of the use of nuclear energy for peaceful purposes. What he refers to as the nuclear engineering technology, I think, is the use of nuclear energy for peaceful purposes. Last year, there was a half-an-hour discussion and he referred to it in the beginning of his speech. He also referred to the fact that the Government's attitude remains the same.

SHRI SAMAR GUHA : I have said that there is a break-through.

SHRI K. C. PANT : It is true that the Government's attitude is that we are not opposed to the use of nuclear energy for peaceful purposes. Without a meaningful application, without its economic significance being identified and of course, the health hazards are also taken care of—my hon. friend knows—he has studied the subject—that the world community has been, particularly the world scientific community, has been studying all the problems that are related to the question of peaceful uses of nuclear energy and they have been particularly concerned by the hazards of radioactive contamination, by the environmental hazards, and the ecological hazards involved in the use of nuclear devices. This question is so important that those countries which have developed this technology and which have been dealing with these devices for years, even they are moving very cautiously in the direction of the actual utilisation of nuclear energy for commercial or peaceful purposes.

Now, he referred to the fact that breeder reactors have been built. He referred to an

important fact which has a bearing on the entire future of the nuclear energy programme in the country and that is that we have lot of thorium in our country is a fact, thorium which can be used for the test breeder reactor and which can be a source of nuclear fuel for us. This is certainly an important area. We happen to have large deposits of thorium. Therefore we are certainly interested in carrying out experiments which will enable us to utilise these deposits for the purposes of peace, that is, the utilisation of nuclear energy for peaceful purposes. Thorium will be irradiated in the fast-breeder test reactor about which he had asked a basic question. He is aware of the developments with regard to these things. Thorium will be irradiated. U-233 will be produced and this fissile material will be had as extra nuclear fuel. It will help us, to take us towards independence. He referred to these facts. These are important facts in the Indian context.

The other question which he referred to was this. That is, about the utilisation of this nuclear energy for converting deserts into fertile lands and so on. I read his last year's speech also and in that he had referred to building of mountain roads and diverting of rivers and so on. These are exciting possibilities but, as technology has been developed till now, they are full of hazards which accompany any kind of explosion of a nuclear device in the atmosphere. After all when you construct a road or divert a river any kind of explosion of nuclear device will immediately release radio-activity and all the hazards with which the world has now become failure will come into play.

These facts have to be borne in mind and that is why the experiments that have been carried out have been carried out underground. Apart from the Nuclear non-proliferation Treaty, nobody otherwise would like to experiment on the surface of his land because immediately the contamination hazard will come into play. Nobody will take that risk. In 1953 and 1969 these experiments have been carried out by the USA underground.

I find that the Board of Governors of the IAEA discussed the findings of a Committee which they had established last year on the application of nuclear explosions for peaceful purposes and the role of the Agency in this matter and they reached this conclusion.

"In the light of the experimental status of the technology the Agency should approach the subject on an evolutionary basis, devoting its attention initially to the exchange and dissemination of information."

As my friend is aware, the Agency does not confine itself to dissemination of information but to give technical assistance also. That stage has not yet been reached. They acknowledge the potential by saying that they should approach the subject in an evolutionary basis. But they have also said ; the stage has not been reached where we can actually give technical assistance.

There has been significant progress in the awareness of the potentialities of this technology. This year the Atomic Energy Agency in Vienna organised general discussion on the application of contained peaceful nuclear explosions for industrial purposes. The emphasis is on the word "contained". It means underground, not overground explosion, neither over water, nor over land.

By and large, the possibility or the potential of the application of nuclear explosive devices underground appears to be more promising than the use of these devices overground or for surface excavation purposes, for the obvious reason that there is natural containment of the spread of the toxic radio-active elements underground, whereas on the surface they can spread far more easily.

Another reason why it is safer underground is that when there is a nuclear explosion underground, the energy released is sufficient to vaporise the rocks in the immediate vicinity of the point of explosion and it melts the rocks some distance beyond and these shock waves shatter the rock for a considerable distance which in the case of a large explosion can extend hundreds of metres. So, there is vaporisation of rock, liquefaction of rock and then cracks which extend for hundreds of metres. The result of an underground nuclear explosion which involves a continuous caving in process is a crater further packed with crushed rock to a considerable depth. I am giving these details, because the hon. Member referred to some of the applications of nuclear energy for peaceful purposes. And it will help hon. Members to understand how one can utilise this energy if one understands the pro-

cess through which one creates these cavities.

I would now like to refer to some specific practical uses to which underground nuclear explosions can be put. Underground cavities surrounded by impermeable rock can provide storage capability for fluids such as natural gas, oil and water. For instance, a few years ago, when I was a member of the Public Undertakings Committee, I went to Gujarat and I found that along with the oil that was being recovered, a certain amount of gas came, but there was no utilisation of that gas at that moment, because the power plant which was to receive that gas was not ready. Therefore, the gas had to be flared and had to be burnt. Many of the hon. Members would have seen that in fertiliser plants there is a certain amount of gas which has to be flared. There are exciting possibilities, if you can create a cavity in an impermeable rock by pumping in this gas and storing it there for future use. Similarly, a lot of rainwater which goes into the sea could also be stored. It is a very exciting possibility if one can have these large caverns. In Rajasthan, for instance, instead of allowing this water to flow into the ocean, if we can divert the water underground by pumping it in, then we can use it whenever we need it for agricultural or drinking purposes. This kind of exciting possibility is thrown up by these explosions. Then, the creation of permeable rock masses can be very beneficial in extracting petroleum and natural gas in situations where they could not be economically recoverable by other means such as in the case of shale oil. This means that when shale oil is trapped in small quantities in rocks and it cannot be extracted otherwise, this explosion would squeeze out the oil, as though the oil were contained in a sponge ; it would squeeze it out ; a cavity would be created and the cavity would be full with oil or gas as the case may be. Then, you can bore a hole and take out this oil or gas. So, what would otherwise be non-recoverable becomes recoverable through this device.

Then fracturing of rocks underground may make it possible to extract minerals by simple excavation. Copper, nickel and uranium are three minerals whose economic recovery might be made by fracturing and *in situ* leaching of low-grade ore. In India, underground leaching from low grade copper and nickel bearing ores may provide a valuable source of two

[Shri K. C. Pant]

metals which are of importance for our economic development but are so far only located in scarce deposits amenable to commercial exploitation using conventional means. What is suggested here is that the rock is pulverised underground and a solvent is pumped in and this brings out the metal in soluble form and later you recover it. These are the possibilities that are opened up.

Now I must refer very briefly to the time element. Shri Samar Guha rightly emphasised the time element. Why are we not ready, when we will be ready and so on. The main point we have to keep in mind is that a series of comprehensive surveys and economic evaluation have to be carried out before one can conduct experimental work of significance. These two are important factors. A most important environmental hazard is related to the fact that there is a lot of underground water movement and we must be absolutely certain that no explosion contaminates underground water movement. In fact even now experiments are being carried out with certain isotopes to study the movement of the underground water current and so on and to see what are their source of replenishment so that one can know exactly what the underground movement of water is and thereby be in a position to experiment later on if a proper site presents itself. Similarly, studies seismic activities have to be carried out. Because an underground explosion releases all kinds of general reactions in the seismic field that too can be dangerous. An understanding of the geological structures in the area in question through all available means is essential if hazards from earth movement have to be avoided. These are the two important factors that must be studied. Our scientists are today engaged in gathering all relevant information in order that peaceful uses of nuclear explosive devices, when the technology is developed can be available for the economic benefit of this country.

SHRI SAMAR GUHA : I suggested that the contract with Canada may be re-examined.

SHRI K. C. PANT : My hon. friend referred to the use of isotopes in agriculture, medicine, etc. These are not barred under the agreement. It has nothing to do with explosion. With regard to the Canadian agreement I thought you referred to this aspect. This is a different technology altogether though in the process of nuclear reaction isotopes are pro-

duced. I think I have covered almost all the points. I do not want to get involved in a debate on the agreements etc. That is a larger question and it has been discussed by the House.

SHRI SAMAR GUHA : I have been sitting patiently. It is your new Assignment and I did not want to put you in trouble. My point is that Japan has given a clue. Can we re-examine the basis of the contract with Canada? The present position is that the fuel that is produced by us from the Canadian reactors—we possess it but we do not actually own it. If we own it we can have freedom in regard to its use for any purpose, even for peaceful purposes.

SHRI K. C. PANT : I may be new to the department but I am not new to the subject. My hon. friend and I have in fact discussed this problem in the past also. We are discussing the peaceful use of nuclear energy. He has brought in tactical weapons and other things, thereby making it difficult for me to comment on the subject. That is my difficulty. I hope he understands it.

SHRI N. SREKANTAN NAIR : May I know from the hon. Minister whether India has the technical know-how for controlling, containing and ordering at a particular time and place the explosion of atomic bombs and atomic devices and secondly whether we are finding by trial and error about the fast breeder reactor or whether we have got the know-how for the fast breeder reactor in Kalpakkam or in any other place where it is planned?

SHRI K. C. PANT : So far as the fast breeder reactor is concerned, its construction will start soon and it will be constructed. All the necessary preparatory steps have been taken. And, as I said, our scientists are studying all the relevant aspects. I have discussed some of them in detail. Some others are purely scientific aspects of the matter and related to the detailed technological aspects which I have not discussed. But, naturally, as I said, we are not against the peaceful uses of nuclear energy. In fact, if it were possible to use it, if it were economical to use it, if it could be used without hazards, then certainly,—in fact the whole world is looking forward to a break through in this field.

18.07 hrs.

The Lok Sabha then adjourned till Eleven of the Clock on Monday, July 5, 1971 (Ashadha 14, 1993 (Saka)).