in something like a rocket we may be able to go one fine morning for breakfast to the stars or the moon. It may have such potentialities. People would have laughed in the middle ages if somebody told them about aeroplanes, X-rays, about telephones and wireless and so on. So, today it is quite possible we may laugh in our ignorance at the great possibilities. As I said at the very beginning it is very necessary for us to forget for a while the bomb that smashed Hiroshima or the hydrogen bomb that has destroyed some millions of fish in the Pacific Ocean. It is this bomb aspect that is warping our attitude and blinding us to the great possibilities of utilisation of atomic energy for peaceful purposes.

There is only one solution for it. As our Prime Minister said the other day, there should be a ban on the hydrogen and other bombs. There should be not only a temporary stoppage, but a complete ban so that human attention may be diverted more and more to the peaceful uses of atomic energy. We are certainly on the dawn of a great era and I would earnestly endorse the suggestion made here this morning that this matter should be dealt with on an international level. The quantity of uranium is so very limited that once you leave it to the nations to exploit it as they like, there is the great danger of it being utilized for the production of destructive weapons which will destroy human civilisation. Once you bring the whole of this raw material into an international pool, then it will be used for the best purposes for which human nature is willing to adopt it, and the new era of human civilisation would have dawned. I would therefore, most earnestly endorse the suggestion that there should be an international pooling, international control, of this atomic energy, that there should be a complete ban on all atomic weapons of destruction. I do hope our Government will do their very best towards the achievement of this object.

Shri Jawaharlal Nehru: I am glad of this discussion and grateful to Shri Meghnad Saha for having initiated it, though I feel that he has perhaps done less than justice to the work done so far by our Atomic Energy Commission.

Of Course, it is quite possible and it may be perfectly justified to say that the work may have been, ought to have been bigger, vaster, speedier. That can always be said about any work that we undertake, but quite a large number of fairly competent critics, not very friendly critics either, from abroad have testified to the very considerable work done by our Atomic Energy Commission and have indicated that India has laid the basis for fairly rapid advance in the future.

Naturally, our pace and rate of work is determined by so many factors. Shri Meghnad Saha mentioned that the United States of America spend one thousand crores of, presumably, rupees a year on this, that the United Kingdom spends a hundred crores and other countries spend less. Well, it is perfectly true that our average rate of expenditure as exists is Rs. 1 crore. Now, it is possible, of course, to increase the sum and also increase the other thing, facilities for doing this work. That is a matter of right priorities and giving more importance to some aspects. For my part, I should like to increase very rapidly to the very full the geological and like surveys of India. Of course, we have got a geological survey but not that type of geological and mineral survey and other survey which would require hundreds and hundreds of people, competent people, to do it. I confess that I am not satisfied at the rate at which we do these things. Anyhow, I would submit that we have made progress even comparatively speaking—leaving for the moment some half a dozen big nations of the world who have far greater resources and who started much earlier than us. Right at the beginning, may I say that I welcome Dr. Saha's suggestion that specialists in this field, that selected scientists

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who are interested directly or even indirectly in this work, should meet together and gather at a conference or a symposium,—whatever you like to call it—to discuss this matter and to make suggestions as to how to make greater progress and what new lines to take up? I entirely agree with him that it is a very desirable step to take. But when Dr. Saha goes on to say that this meeting of scientists should take place to draft a reply to President Eisenhower, I was amazed,—to draft a reply to the speech of President Eisenhower delivered before the United Nations, a speech which is worthy of our respect and careful attention. But for a number of scientists to sit down and draft a reply to President Eisenhower does appear to me somewhat astounding.

Shri Meghnad Saha: I meant this: it is to advise our Government in drafting a reply.

Shri Jawaharlal Nehru: It comes to the same thing. First of all, I do not quite see why even the Government of India should sit down to draft and send a reply to the speech delivered by the President of the United States to the United Nations. I am not aware of any other Government having drafted a reply and sent it. President Eisenhower's speech was, if I may say so with all respect, a fine speech, with generous sentiments and with a proposal which deserves our attention. But the proposal was a vague proposal; it is a vague indication of which way one should look; not exactly a specific proposal. If you want to know what proposals there are, go to the Disarmament Conference or to the Commission dealing with atomic energy matters. You can see there the proposals of the different countries, and then you can consider them. Anyhow, I am glad of this discussion and I would like this discussion, as far as possible, to be separated from the purely political aspects. I know it is difficult to do that. Hon. Members opposite and those on this side talked about banning these weapons. Well, we feel that we should ban or control all these terrible weapons. But it is not quite clear to me how our sentiments in this matter are going to result in that ban, or how a strong speech in this House can result in banning them. Ultimately, sometime or other, they will have to be controlled, if not put an end to. Well, from a good deal of what we know of this world, if one is all the time talking about banning this, who is to bell the cat? It might have been possible if there had been no conflict or collision in this respect—each afraid of the other. Nobody is going to be controlled till he is quite certain that the other is controlled; and nobody is going to be certain till there is much more confidence in each other than there is at present. Each will think: 'oh, there is some public protestation; secretly, this will not be given effect to.' I am not going into that matter. As I said, it it obviously necessary to control these weapons. But how to control them? How to ban them? That is again another matter of great difficulty. It is all very well to say, control or ban them. Who is to ban them? Who is to control them? International law, as is well known, is rather a feeble instrument even yet. So, let us discuss this question apart from its political aspect although it is intimately tied up with it. One cannot dissociate it; nevertheless, let us consider it apart from politics.

Further, in this twentieth century, in the last generation or two, we have come up against certain explorations of the remotest frontiers of human knowledge and they are leading us to all manner of strange discoveries and strange consequences. Max Planck's quantum theory and, later on, Albert Einstein's theory of relativity, changed the whole conception of the universe. Most people may not realise it even now though they changed the whole conception of the universe and the world. All other

things followed. The atom bomb struck us because of the tremendous power to kill. Vast changes in human conception had taken place as my friend Mr. K. D. Malaviya suggested. This only came on the scene in 1939 when some German scientist did something, split the atom or whatever they say rather crudely. Soon after, the Americans did it. In America, it was in fact a migrant scientist who did it and in 1942 something else happened and a chain of reactions was established by Italian scientists. By August 1945, Hiroshima fell, as the result of the work from 1939 to 1945.

Since then, of course tremendous progress has been made in this and the world has been struck by it because it is a terrible thing. Now, therefore, the human mind and human efforts are unleashing tremendous powers without quite knowing how to control them. You will not control these by a mere demand to ban this or to ban that. Nobody can really control the human mind from going on unleashing new things; they will go on doing that. How to approach this problem of control which is of vital conseqence is one of the political problems of the day. Behind that lies some measure of lessening the tension in the world, some measure of confidence in each other by the great nations, some agreement to live and let live and not to try to destroy others, to allow each country to live its own life. Unless that approach is made, the only other approach is of conflict and if the idea of conflict is in the minds of nations, then the atom bomb will undoubtedly remain; it doesn't matter your going on talking about banning it or not.

Now, let us consider these possible issues. It is perfectly clear that atomic energy can be used for peaceful purposes, to the tremendous advantage of humanity. Probably, it may take some years, may be five years or may be ten years, but not too long, before it can be used more or less economically. I should like the House to remember one thing. The use of atomic energy for peaceful purposes is far more important for a country like India, that is to say, in a country whose power resources are limited, than for a country like France, an industrially advanced country. Take the United States of America, which has already tremendous power resources in other ways. It is not so much for them to have an additional source of power like atomic energy. No doubt they can use it; it is not so important. It is important for a power-starved or a power-hungry country like India or like most of the other countries in Asia and Africa. I say that because it may be to the advantage of the countries who have adequate power resources to restrain and restrict the use of atomic energy because they do not want that power. It would be to the disadvantage of a country like India if that is restricted or stopped. It is a very important factor to remember from the point of view of this so-called international control. It is probably loose talk, this talk of control. Who is to control it internationally? Who are the international nations who are going to control it? One may say, the United Nations. Obviously, there is no other organisation approaching the United Nations in its international scope. And yet, the House knows, the United Nations even now does not include in its scope even the big nations of the world. Some of the biggest are kept out of its scope. The United Nations can only control itself. It cannot control any nation which is not in it, which it refuses to admit and with which it would not have anything to do, so that the result will be that you control a great part of the world, but still there is a part of the world which is not controlled by it. That part, over which there is no control, makes all the mischief. You do not control it; it is not, in fact, recognised by you; you treat it as if it did not exist. It will go its own way and upset the apple-cart. Therefore, the question of international control becomes difficult. Reference has been made in President Eisenhower's

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speech to this international control. We all agree with the proposition that if it can be so organised, there should be proper international control and proper use made of the stock of fissile materials, so that all countries can use them for research work or for proper purposes. Well and good. But how is this to be done? There the difficulty comes in, President Eisenhower refers to some agency of the United Nations. That organisation appears reasonable, but then, let us go back and see what the actual proposals are before us in regard the atomic energy of various countries. These are the latest proposals, at the beginning of this year, of the United States:

"An international control agency shall be set up by the United Nations. It shall hereafter be an independent body outside the control of the Security Council and of the United Nations." The United Nations is merely supposed to set it up and wash its hands away. It becomes an independent organisation. So it is a very important matter as to what an independent organisation is. This organisation will, of course, have an unlimited right of inspection. Agreed. "It shall have the right to maintain its own guards on the territory of any foreign State, licenced to engage in any of the processes of the production of or research in atomic energy." It becomes a super-State atomic energy body, maintaining its own guards, armies or small armies, or whatever you like. Then again, "it shall own and control"—mark these words—"the raw materials mined, the plants in which the ore is processed, and all plants which deal with production of atomic energy wherever they may be situated in any country of the world." This is a very far-reaching provision, namely, that all our raw materials and our mines are owned and controlled by that independent body, which is even independent of the United Nations after it is created. It means tremendous power being concentrated in the hands of a select body. "It shall decide if, when and where and to what extent the various processes may be carried out and in which parts of the world atomic energy plants may be established"—and there are limitations also—"and it shall have authority to issue or withhold licences from countries, institutions or enterprises engaged in any activities relating to the production of atomic energy," and so on.

I read to you some of them and there are one or two others also. This tremendous and vast power is being given to a body which is even independent of the United Nations, which has sponsored it or started it. Who will be in this body? That is an important factor. Either you make the body as big as the United Nations with all the countries represented, or it will be some relatively small body, inevitably with the Great Powers sitting in it, and lording over it, and I say with all respect to them that they will have a grip of all the atomic energy areas and raw materials in every country. Now, in a country like India is it a desirable prospect?

Some Hon. Members: No.

Shri Jawaharlal Nehru: When hon. Members talk so much of international control, let us understand, without using vague phrases and language, what it means. There should be international control and inspection, but it is not such an easy matter as it seems. Certainly, we would be entitled to object to any kind of control which is not exercised to our advantage. We are prepared in this, as in any other matter, even to limit, in common with other countries, our independence of action for the common good of the world we are prepared to do that, provided we are assured that is for the common good of the world and not exercised in a partial way, not dominated over by certain countries, however good their motives might be. These are the difficulties that arise in this matter.

In President Eisenhower's speech these details are not gone into, but he says that what he calls "normal uranium" should be controlled. I could have understood even control of fissile materials. But President Eisenhower refers to "normal uranium". It is not clear what he means by "normal uranium". Presumably he means uranium ores. So, again we get back to the raw materials. So that, there is this difficulty. We want international control of this; we want fair use of it for peaceful purposes. This is common ground, not a matter for argument. But when we come to how it is to be done, we immediately get into difficulties. I submit it would not be right to agree to any plan which hands over even our raw materials and mines, etc., to any external authority. I would again beg the House to remember this major fact that atomic energy for peaceful purposes is far more important to the under-developed countries of the world than to the developed ones. And, if the developed countries have all the powers they may well stop the use of atomic energy everywhere, including in their own countries, because they do not need it so much, and we suffer.

We welcome the entire approach of President Eisenhower in this matter. Since he delivered his speech this question has been discussed by representatives of other Great Powers chiefly concerned, and if they find out any suitable method for creating this international pool, we will be very happy, —subject to what I have said, to share with, and give what we can to it.

Dr. Saha drew a rather dismal picture of our pitiable state in this matter. He referred to our coal supplies running out. Now, my own information, derived from our best geologists is contrary to what Dr. Saha said. I believe there is a dispute between Dr. Saha and our geologists, but with all my respect for him, I would take our geologists' word in this matter. Dr. Saha is an eminent physicist, but our geologists are expected to knew more about coal than Dr. Saha.

Here I may say what our geologists' estimate of our coal reserve is.

Total reserves of coal in the Indian rock-formations, upto a depth of 2,000 feet—60,000 million tons.

Total reserves of available coal, of all grades, which are considered workable by present methods—20,000 million tons.

Reserves of first grade coal, workable—5,000 million tons.

Reserves of coking coal suitable for metallurgical use—1,750 to 2,000 million tons.

Present-day annual consumption of coal in India, of all grades —35 million tons.

Annual consumption of metallurgical grade coal (coking coal used both for metallurgical and non-metallurgical purposes)—About 8 to 12 million tons.

Consumption of coking coal purely for metallurgical purposes —About 3 million tons.

As is well known we are wasting our best coal by using it in our railways, where it is not necessary. Attempts are being made in our railways not to use our best coal. Consumption of coking coal purely for metallurgical purposes is about 3 million tons, while our annual consumption of metallurgical grade coal both for metallurgical and non-metallurgical purposes is about 8 to 12 million tons, This is chiefly because our railways and some of our factories use this high grade coal, because it is easily available. We should curb this down, because our best coal should not be wasted in this way, while other coal is available.

Recent experiments conducted in India by the Fuel Research Institute and private industrial concerns, like Tatas go to show that our second-grade coal is capable of improvement

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to first-grade by coal-washing and blending methods. Large scale trials for (I regret I do not wholly understand the meaning of the word which I am going to read) "beneficiation"—making it better, I suppose—of low-grade coal give promise that India's coal resources will prove adequate for all her present as well as future needs.

According to the above summary, assuming that correct methods of mining are employed and waste is eliminated, we have reserves of 2,000 million tons of high-grade and coking coal which should last (if the consumption were restricted to use in iron and steel and other metal manufacturing industries alone) for a period of about 650 years. But India is using coking coal today for ordinary furnace and railway purposes, for domestic fuel, and some industrial uses to the extent of about ten to twelve million tons per annum. At this rate the life of coking coal reserves will be reduced to 160 years only.

The position, however, is different in respect of non-coking coal of food and medium quality, the supply of which is such as would last for several hundred years, allowing the present rate of consumption plus a progressively increasing rate for future industrial expansion.

Of course, India's resources in coal are much less than those of the United States or the U. S. S. R.

Shri Meghnad Saha: May I interrupt? If our industrial power is increased ten times, its life time would be 650 divided by 10 which is 65 years. It is a very dismal prospect.

Shri Jawaharlal Nehru: The hon. Member is thinking of metallurgical coal. The other coal, even if the industrial capacity is increased tremendously, is enough to last for several hundred years.

Dr. Saha put a question, directly or indirectly, as to whether we have the necessary scientific personnel or requisite competence to set up a nuclear reactor. He mentioned that five years ago, we had stated that it would be set up. He is perfectly justified in pointing out that it has not been set up. It is true there has been delay. It was delayed due to certain factors—factors outside our control. We are setting it up. We have obviously to get some equipment from abroad. We have to get heavy water which we do not produce yet. It was a little difficult to get this heavy water but I believe things are in good shape about the starting of this moderate size reactor.

As for our scientific personnel, we cannot compare ourselves with the great countries but leaving out some of the big countries, we are supposed to be rather good in our scientific personnel even now. We can put up a reactor even if fissile materials are not available from the common pool as President Eisenhower has indicated. It is not that we are entirely depending upon some common pool. Even if some help may not be forthcoming, even if the fissile materials and the modulators do not become readily available, I think we can do it. We have sent several teams abroad and people are being trained both in India and abroad for this purpose. I think we are justified in assuming that this would produce results very soon.

The Atomic Energy Commission has also a small team which is gaining experience in the use of radio-active isotopes which will become available when the reactor starts functioning, for biological and other research and for medical treatment.

Now, the main purpose in putting up the reactor is to acquire the necessary technical experience which will help us later on to put up power plants for peaceful purposes. Therefore, some of the workers are engaged in gaining experience in some of the technical processes like heat transfer which will be needed at some later stages. The reactor will also help us to produce some of the radio-active isotopes. At present radio-active isotopes are used in biological research

for study of metabolism of various elements. For medical treatment radio-active isotopes and special radio-active iodine are used. These are much weaker in intensity of radiation and can be easily controlled. But they have a short life. Their effect disappears soon after. It is also used for metallurgical purposes, to follow the progress of certain reactions. All of these can be purchased from abroad even now for peaceful purposes, but they are so short-lived that even in the course of transit they lose some activity. It is obviously more advantageous to produce them here. We have got, of course, a major Division dealing with prospecting for ores and raw materials. Two new Divisions have been started, a Medical and Health Division which deals with the protection of workers against the effects of radiation and with research and associated problems, and a Biology Division which conducts investigations on the biological effects of radiation.

Now, hon. Members have mentioned something about our sending some part of the monazite sands or something else abroad. We have sent them abroad, a little of them. Some five or six years ago they were sent abroad without limit; anybody could come and take shiploads of them. We stopped that. I believe even now there is some theft going on occasionally from the coast. We try to stop that by posting guards and in other ways. But we have not considered the question of monazite as a money-making proposition, although it is a money making thing. But we used it always to give it in exchange for something that we lack for atomic energy development. For naturally we lack things. Naturally, we want something which we can get easily from other countries. So that, we use it as a valuable exchange material. We are in some contact with some foreign Atomic Energy Commissions, notably France and England, chiefly these two countries. I think it first started with the French Atomic Energy Commission, and later England. I do not say intimate contact, but we do help each other. We have therefore supplied them. We have occasionally supplied some things to the United States of America, to some other countries too—I do not know at the present moment, I have not got the list here. But generally speaking, what we have supplied is relatively small in quantity. As a matter of fact we do not want to supply these sands as far as possible. We now supply the processed material. We have put up a factory in Travancore-Cochin for processing that material, and it is much more advantageous for us to supply the processed material than the sands. At Trombay near Bombay we are also putting up a factory. A good deal of work is being done in these matters.

Dr. Meghnad Saha said that there should be no secrecy. I entirely agree with him and so far as we are concerned, we want no secrecy. Our difficulty has been that when we deal with another country, whether it is France or England, when they give us any process or any information, they insist on secrecy for their part and we have to agree because it is their custom. We have to take something from them; we cannot get it otherwise; we have to give that assurance. Therefore, we have to keep that assurance. Otherwise, so far as we are concerned, there is no secrecy. It is obvious that in this matter, we are in the first stages of atomic energy work and not so advanced as the Soviet Union or America or England. So, we have really nothing to hide so far as we are concerned.

Dr. Meghnad Saha suggested that our Atomic Energy Act came in the way and so it should be scrapped. We have no objection to scrapping it or what is more probably desirable, amending it if necessary. We may come to this House for amending the Act. Let us consider the matter right from the beginning. We are perfectly agreeable to consulting or having a conference of eminent scientists and discussing these matters with them. If they make any suggestions for the

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improvement of the Act or for the improvement of the work, we shall certainly accept and adopt them. Even now, as a matter of fact, within the compass of this Act, we are trying to improve and expand our work. I might mention that in some way we ourselves have felt that perhaps the Act is not quite adequate and slightly comes in the way occasionally. But, the difficulty is of adding to the legislation that will come up this session or the next session. Finally we decided not to trouble Parliament at this stage till we are forced to do it and to try to expand our work within the scope of the Act, if we can, to some extent. I can promise this House and Dr. Meghnad Saha that we shall gladly pay every respect and attention to all the suggestions that are made individually or jointly.

Shri N. Sreekantan Nair (Quilon *cum* Mavelikkara): My first complaint about the Atomic Energy Commission is that it has indulged in tall talk immoderately. Secondly, it is more or less controlled by the Tatas, and it has functioned more in the interests of the Tatas than in the interests of the nation.

As regards the first point, you have heard how the Commission had made a claim that in five years, they would be able to utilise the atomic energy. That has not materialised. Very recently, a very important member of the Commission went to Japan and made a very sonorous and spurious claim that within three years, we may be utilising atomic energy for peaceful purposes. When the setting up of a nuclear reactor remains only a cherished objective, which cannot be immediately realised, I do not know how we could utilise it.

Then, there is the question of secrecy to which Shri Meghnad Saha referred and which was also referred to by the Prime Minister. That secrecy is standing in the way of scientists and people interested in this, co-operating with the Atomic Energy Commission. If I may say so, this secrecy is intended to screen the inefficiency, waste and perhaps the shady transactions of the Atomic Energy Commission. In my speech on the Budget Demands for 1951-52, I pointed out that the Union Government is robbing the Travancore-Cochin State of their legitimate share in the price of monazite. The Union Government was paying only £25 per ton whereas the world market price was ten times higher. We would not have minded it so much if it really benefited the Union Government. As a matter of fact, the Central Government is handing it over to the Tatas at £120 per ton and the Tatas go off with a lion's share of the profits. So, they are robbing Paul to pay Peter. That is why we object to it. It is the Tatas, naturally, with their agents in all the key positions in the Government of India that benefit by these transactions. I am one who does not object to monazite being processed because I come from that district where it is refined. My workers, my unions are interested in it, and I do want that it should be refined and it should be sent out as far as possible in the interests of the nation. It must be sent directly by the Government so that whatever benefit we get must go to the country and not to private agencies.

1 P.M.

The hon. Prime Minister referred to the factory in Alwaye. It is more than a hundred miles away from Chavara, and 200 miles away from Manavalakurichi. Even in Alwaye, the processing done is very insignificant. Then, we have got a duplicating process. New factories are set up in Bombay, and the most important processing work is done there. This duplication of processing, and multiplication of factories result in waste. The raw material is transported from one place to another, and from there to a third place. All this costs us very heavily and for no purpose at all. And the material processed in all this is so little that even with the amount of monazite exported, the