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ATOMIC ENERGY COMMISSION

REPORT OF U.S. TEAM CONCERNING THE GAS CENTRIFUGE PROCESS IN  
GERMANY, THE NETHERLANDS, AND THE UNITED KINGDOM  
JULY 13-20, 1960

Note by the Secretary

The General Manager has requested that the attached report submitted by the Director of International Affairs be circulated for the information of the Commission.

W. B. McCool  
Secretary

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SUMMARY OF DISCUSSIONS ON GAS CENTRIFUGE PROCESS  
WITH THE GERMAN, DUTCH, AND U.K. GOVERNMENTS

The following points were established in the course of discussions in Bonn, the Hague, Amsterdam and London:

1. The German, Dutch, and U.K. Governments <sup>1/</sup> all concurred in the United States assessment of the implications of the gas centrifuge process on the Nth power problem and the desirability of achieving uniform classification policies and practices within the four countries where gas centrifuge research and development is carried out.
2. Although neither the German nor Dutch Governments has formally classified their research and development work to date, both the Dutch and German authorities said that unilateral classification was feasible in terms of their respective domestic laws.
3. All four countries recognized the psychological-political problems that might arise with respect to Germany's and the Netherlands' EURATOM partners if Germany and the Netherlands unilaterally classified their work and this action became known.
4. The German, Dutch, and U.K. representatives all expressed an interest in the problem of cooperation in this field. The German and Dutch authorities recognized that such cooperation would involve an agreement or agreements and accordingly, the formal

<sup>1/</sup> Note that U.S. and U.K. use an agreed classification policy and under this policy (OC DOC-68) gas centrifuge work is classified in U.K. as well as in U.S.

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EURATOM Treaty. The preliminary views of the German and Dutch Governments were that unilateral classification would not require:

a. the dissemination of sensitive gas centrifuge technology either to EURATOM or the other member states, and

b. the possibility of cooperation among the four countries without disclosure of sensitive information to EURATOM or the other member states need not, at the present time at least, be foreclosed.

5. The Dutch and German authorities felt that the EURATOM Treaty would probably oblige them to communicate patents to EURATOM, but it would be possible to insure that any patents so communicated would:

a. be held classified by EURATOM and

b. would not be communicated to the other member states except under security safeguards.

It was generally agreed that information contained in patents would probably be less sensitive than know-how and accordingly its further communication to EURATOM or within EURATOM to the other member states would not constitute a serious disclosure of the most significant gas centrifuge technology.

6. It was agreed that the United States would furnish a draft classification guide for the information of the U.K., Dutch, and German Governments, that the Dutch and Germans would review classification procedures that they might adopt, and that the United States and U.K. would bilaterally undertake a similar

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review. Thereafter, the four countries would be in touch through diplomatic channels in order to establish an agreed course of action with respect to classification and to explore further the possibility of cooperation.

7. The U.K., Dutch, and German Governments all indicated that classification might present difficult internal problems for each Government as a result of limitations which might be placed upon industrial participation in or commercial exploitation of the gas centrifuge process.

The character of the discussions with all three countries was exploratory. The favorable reception accorded the United States assessment of the problem argues in favor of the possibility that agreement as to classification by all three countries will be possible. The psychological-political problems associated with classified German research and development of a U-235 production process were noted. Until final agreement on classification has been reached and confirmed through diplomatic channels, it must be recognized that these problems could vitiate the expressed desires of representatives of all four countries to control through classification the future development of this process.

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REPORT OF DISCUSSIONS

IN

BONN, THE HAGUE, AMSTERDAM, LONDON

ON

GAS CENTRIFUGE PROCESS

JULY 13 - 20, 1960

There follows a report on the discussions held in Germany, the Netherlands, and the United Kingdom during the period July 13 - 20, 1960, concerning the implications of the gas centrifuge process on the Nth power problem and the desirability of achieving uniform classification policies and practices within these countries and in the United States where gas centrifuge research and development is being undertaken.

The U.S. Team was headed by Charles Sullivan, Deputy Special Assistant to the Secretary of State for Disarmament and Atomic Energy. Other members of the team were:

Edward J. Bloch, Assistant General Manager for  
Manufacturing - AEC

A. A. Wells, Director, Division of International  
Affairs - AEC

Wilbur A. Strauser, Deputy Director, Division of  
Classification - AEC

George A. Kolstad, Chief, Physics and Mathematics  
Branch - AEC

Howard Meyers, Political Officer assigned to U.S.  
Mission to EURATOM

July 13, BONN

US group met morning and afternoon with following German officials. From Atomics Ministry: Kaissling, Director Technical Department; Schulte-Meerman, head International Cooperation Division; Haase, isotopic separation specialist; Scheidwimmer, head legal division, Heyne, responsible for bi-laterals; Haunschild, EURATOM affairs. Also Meyer-Lohse, Foreign Office; Schmidt-Amelung, Economics Minister; Haertel, Justice.

After Kaissling noted no publicity was being given by German Government to meetings and FEDREP was taking every effort to insure existence meetings remain confidential, Sullivan explained that US, which had been engaged in centrifuge research for years, had some time ago classified R and D to avoid indiscriminate extension to other countries of information and equipment in view NTH countries problem, but that US classification process had not hampered centrifuge development. Kolstad then explained in some detail both US developments and what US knew of work in other countries, stressing fact that economics of centrifuge approach made it particularly attractive to countries otherwise not likely to devote effort to isotopic separation; fact was relatively easy by changing "plumbing" to turn centrifuge cascade from low

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enrichment to weapons-grade production. Control problem essentially involved trying hold off development by NTH countries at least until some form of international safeguards could be achieved.

Following exchange on potential centrifuge process, Kaissling explained that until recently Federal Government saw no reason to classify since work to that time had not so warranted, but when in spring 1960 Atomic Ministry realized present developments were leading to cascade establishment, they had arrived at same conclusion as US re potential centrifuge. As result, FEDREP presently considering classification question, both as regards controlling dissemination of knowledge and distribution of material but had not yet made decision. His personal view was classification was likely and he asked for US views re consequences of classification in terms international cooperation after classification. US representatives stated belief US would be interested in cooperation if German Government desired but noted international complications must be considered, particularly, attitude certain German-allies who might be excluded from cooperation.

After Germans explained difficulties as result their centrifuge work being carried out by university scientists and industrial firms who would expect compensation if work classified, they posed two questions: (A) What possibilities for international exchange in centrifuge field remained open after work classified; (B) what is classification procedure in US. US representatives explained how international exchange works in terms US Atomic Energy Act, pointing out if security standards of the party adequate in US belief, this provided legal basis for exchange in classified areas. Also explained meaning various security classifications. Germans noted that they had experience in classified military secrets but none in atomic energy field since Federal Atomic Energy Act did not provide for other than peaceful applications. However, they believed they could classify atomic matters under German Criminal Code Section re unauthorized disclosure damaging government not merely in military but also political and economic sectors.

Germans gave impression that while they could not give unqualified answer they believed security classification problem presented real internal issues for them other than finding by the Government of a national security requirement. However, they were troubled by two basic questions: (A) Could US firm exchange information with German firm without pre-existing government-to-government cooperation agreement; (B) If answer to (A) was no, as they thought (which US side confirmed), then what steps would need be taken with EURATOM Commission in light Article 29 EURATOM treaty since EURATOM consent to US-German bi-lateral would be required and EURATOM would probably wish to have available information exchanged by both sides.

US side responded that if Germans so desired, US representatives would ascertain US Government interest in bilateral. Germans responded they would not wish to press this point at the moment, and had only raised it to show issues involved. Re EURATOM treaty, Article 29, problem, US representatives explained USG aware of problems and wished assure German delegation in event FEDREP decision classify, US would support German Government in bringing issue to EURATOM's attention.

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Germans replied this declaration was wholly satisfactory to them. Meeting terminated with agreement reconvene morning July 14. In private conversation Kaissling informed Sullivan FEDREP decision on classification expected very soon. Before departing, Germans stated they would inform USG through Foreign Office of developments in their considerations of whether German Government might initially classify centrifuge work prior to resolution issues raised re bi-lateral agreement and Article 29 EURATOM treaty.

July 14, BONN

Germans stated classifying this area would only be useful if other countries working on centrifuge also classify. They explained problems Euratom treaty, noting obligation Article 25 required them convey patents, but that patents would not be published.

German ability classify this area complicated by fact normally could not classify on basis of national security interest if information concerning development had already been published either in Germany or in other countries or if access to such information was not classified in other countries. Thus, if Netherlands and UK did not classify centrifuge development, Germany would not be able to do so.

Sullivan explained US intended discuss centrifuge problem at Hague and suggested would be advisable inform Dutch general lines of US German discussions, then informing Germans on Hague conversations. German delegation welcomed this and, in light US advice that UK centrifuge work was classified under joint classification guide as would be work in Canada if Canadians entered field, observed that classification issue for Germans now appeared center on results US-Dutch conversations. They expressed their willingness have US explain to Dutch nature US-German conversation.

After Kaissling observed Germans were now faced with issues raised by desire German researchers to build large number of centrifuges for cascade operation, he asked for US views on development and research areas which needed to be classified. Kolstad, in response, suggested following areas of classification:

(A) All information on cascade construction and operation;

(B) High-speed attainment, i.e. in excess 400 meters per second.

(C) Gas flow inside advanced units but not general theory of gas hydrodynamics.

(D) Design information on plants and pilot plants, both technical and economic factors.

(E) Advanced bearing design.

(F) Existence of major new steps.

US side agreed send Germans classification guide for German information in connection with above.

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US group stated had already advised Euratom commission and French intention discuss centrifuge problem with Germans; that US should inform Euratom and French that US Germany had general exploratory discussions on aspects this problem. Germans agreed this was proper line. Re possibility press leaks or queries raised by other groups, USDEL stated should say had discussed various problems in field of peaceful uses of atomic energy. Germans thought should say centrifuge was one of many areas in field.

July 15, THE HAGUE

US group met S. Meijer, Atomic Affairs Advisor, Foreign Office, and Baron A. N. Van Aerssen, head Atomic Affairs Bureau, Foreign Office.

Sullivan explained US views re implications centrifuges on NTH country problem, fact that US and UK have classified centrifuge research and development, that US group had just discussed problem with Germans; and that we understand Germans can legally and technically classify area but have basic issues re obligation to EURATOM and psychological reaction other countries to fact Germans classifying work in atomic energy field. Nevertheless, Germans appear accept need classify; they are currently exploring problems involved; they have agreed US should inform Dutch of US-German talks. Germans particularly interested Dutch reaction because believe need have all countries engaged centrifuge work, at least in free world, restrict information in order have effective control.

Dutch representatives indicated they favor classifying work in Netherlands, for reasons similar US while noting this required agreement other ministries concerned although legal basis existed to do so. In discussion during which US group outlined classification areas involved and places where work going on, essentially in terms discussed with Germans, Dutch made following points:

(1) Noted commercial possibilities increased likelihood industry pressure make sales, and intimated might wish consider possibility agreeing on marketing of centrifuges (this topic not pursued further). However, admitted only limited commercial possibilities and said would only be safe to sell to stable governments, which were few in number.

(2) Believed EURATOM did not present real problems. Information involving military aspects was essentially excluded from treaty requirements for reporting, as opposed to peaceful uses information; "know-how" did not need be patented; might be possible arrange to keep information secret, as had been done with French uranium production figures, where EURATOM Commission had secured council consent that this information be kept confidential by EURATOM and not distributed, a condition postulated by French. In sum, they thought EURATOM Commission could not be kept out completely, but detailed technical information could either be kept secret or not made available to EURATOM Commission. Contract would need be made at some point with Commission.

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(3) Suggested advisable agree on common policy among western countries involved in development, and then approach EURATOM. In this connection, believe would be helpful if Dutch and Germans first discussed problems while US-UK did likewise. Then, through diplomatic channels, could advise each other and might look towards four-power meeting. They would advise US of results of German-Dutch conversations. (US representatives reserved on idea four-power meeting but thought Dutch-German discussion good.)\*

(4) Agreed with US suggestion that EURATOM and French might be informed that talks had been exploratory on potentials of centrifuge but no mention would be made of procedures suggested paragraph 3 above. Agreed also line, in event press leak, should be same as that US had agreed on with Germans.\*

(5) Thanked US for agreeing make available classification guide on area US placed under control in centrifuge development.

July 18, AMSTERDAM

US group met with Kistemaker, FOM; Rijsinge, technical director Reactor Centrum Nederland; Meijer, Foreign Office; Beekman, Director FOM; Beets; Welthuisen Werkspoor. Following explanation by US Team essence problem in terms similar to but more limited than Bonn and Hague, Kistemaker advised his group had tried come to some agreement with Germans over last six months on regulating dissemination information in centrifuge area, but without success. He said basic problems were patents and controls. He believed Dutch about as advanced in centrifuge field as Germans, but observed was not clear how far Dugussa had proceeded. He outlined what he knew of German development and remarked that, while Dutch wished continue contacts and cooperation with Germans, they were disturbed by fact Germans at Frankfurt had relations with East Germans at Jena. He said his impression Steenbeck in East Germany had ideas which Zippe (who had carried out work at Virginia) had missed, and had been real brains behind Russian work this field.

Kolstad outlined areas information which US thought should be subject to controls; as previously described at Bonn and Hague. Strauser described US classification system.

\*Embassy Bonn outlined July 15 discussions the Hague to Kaissling and Meyer-Lohse July 19. Both agreed with procedure common policy although possibility four-power meeting not discussed. Assumed Dutch will take initiative in contracting FEDREP but if no word received shortly they will seek out Dutch. Also agreed that EURATOM and French be informed within limits specified in Hague discussions and assumed that US will do this. FEDREP officials' interpretation Dutch views is that patent information could be made available EURATOM Commission subject Council's approval that such information be kept secret. Wanted to know if this acceptable US. Embassy officer replied view expressed was that of Netherlands and might not necessarily reflect final US position. Rather best way handle patentable information with EURATOM should only be decided after German-Dutch and US-UK consultations. Agreed that would continue keep each other informed regarding further developments i.e., after their discussions with Dutch and ours with UK.

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Kistemaker responded that Germans not only had most information re gas flow in centrifuge but had widely published their material. Thus, was difficult to classify this area. Likewise true for cascade data, since much theoretical knowledge published. He admitted might be different story for "know-how", which was perhaps key to restricting dissemination of data. He noted these major problems: How to control R and D; how to control sale of material once technical development reached stage where, say, 10,000 centrifuges could be made; and how to control material produced. He observed market for centrifuges might be larger than one initially estimated, since they would probably be used to simplify "hot chemistry problem" to recover fuel elements from reactors in about 10 years time. He touched again on security problems by saying Reactor Centrum Nederland had security control on project to be sure of reliability of people involved, but that his apprehensions re East-West German contacts made him believe would be helpful centralize work, e.g. by having Germans and Dutch carry out efforts in one place in Holland. (US group explained Germans at Bonn had said classification would cut-off information flow to East.)

Discussion touched upon patent problem, and U.S. side explained how U.S. system worked plus fact there could be protected cross-filing under secrecy if agreement so reached with other countries. EURATOM patent problem was raised, and Meijer answered in same terms as Dutch had done in Hague meeting July 15.

Kistemaker finally said personally believed was no real domestic difficulty with classifying development but this necessitated agreement with Dutch industry. Beets replied industry would cooperate loyally but if no possibility selling product they would want complete government subsidy or would not work on development.

Meeting ended with agreement by Meijer and Kistemaker to discuss details further. Meijer privately told U.S. representatives he had to develop classification policy first in detail with laboratory people before it could be discussed with industry representatives in detail.

July 20, LONDON

Team met at AEA with Peirson, Croome, Macklen and Phillips (AEA), Hainworth (Foreign Office) and Michaels (Ministry for Science).

Wells explained recent conversations with Germans and Dutch had been encouraging, that both viewed centrifuge development with concern; that Dutch could classify and Germans thought was possible for them to classify but had to consult further within German Government before reaching final decision. Kolstad summarized briefly historical and technical developments in this field in U.S. and other countries. He stressed ease of switching over from low enrichment to Weapons-Grade production by changing "plumbing" and consequent difficulties for safeguards in this respect. Kolstad outlined area in which U.S. believes information should be classified and safeguarded, in same terms discussed at Bonn and Hague, and noted U.S. would send centrifuge classification guide to Germans and Dutch as basis further consideration and would send London if U.K. wished (British welcomed this).

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Major points raised by British in ensuing discussion were following:

1. Since Zippe work at Virginia was unclassified, Germans and Dutch have been carrying on their efforts to present unclassified, and much had been published of this work, would any attempted classification along lines U.S. suggested in fact be effective? Would it be possible for NTH power, on basis existing unclassified information and availability centrifuges at present development stage, to build cascade and produce weapon-grade material even though production would be highly uneconomic? (U.S. group admitted this was to some degree a possibility, but key to development problem was "know-how", which had not been published, and that U.S. believed only Brazil had received centrifuge, of countries outside those with which U.S. had been discussing this problem. In this connection, British stated understood Brazilians were operating their three units in cascade at Sao Paulo, and both sides agreed it was advisable ascertain more clearly what Brazilians were doing.)
2. It was noted that classification of this area was provided for in joint U.S.-U.K. classification policy. British indicated they thought there might be difficulties for them with British industry. They observed certain firms (specifically Rolls Royce, English Electric) appeared actually or potentially interested in centrifuge development. At their request, U.S. agreed to send AEA written information re classification rules and their effect on patents, etc.
3. British were concerned by practical difficulties of discussing and agreeing upon classification guide with Dutch and particularly Germans and in developing common security standards with Germany. They noted it would be exceptionally difficult for Germans to classify this area and keep information from their allies, in light anticipated psychological-political reaction which could be expected once it eventually became known, as was certain, that centrifuge development was classified. They expressed considerable apprehension about state of British Parliamentary and public opinion in this respect. They expressed divergent views re whether psychological-political problem would be eased or worsened by agreements with Germans to exchange classified information in this field, but agreed that this possibility needed further discussion among interested British ministries before it was worth while further examining with U.S.
4. They expressed strong interest in being kept currently advised of further developments arising from German Dutch, U.S. contact this matter.
5. They were interested in problem of EURATOM's rights and responsibilities of Germans and Dutch to EURATOM, and U.S. group briefly summarized its understanding of German-Dutch interpretations in this respect and fact both Bonn and Hague representatives believed they will at some point have to discuss this question with EURATOM Commission.

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6. British stated clearly they shared US concern about degree to which centrifuge development affected NTH country problem, wished to restrict improper dissemination in this area, but noted needed keep in mind whether useful purpose would be served by classification if we found too much information was already available or would become available in public domain.

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