

## June 17, 1993 Interview with André Finkelstein by Avner Cohen

### Citation:

“Interview with André Finkelstein by Avner Cohen,” June 17, 1993, History and Public Policy Program Digital Archive, From the personal collection of Avner Cohen.

<https://digitalarchive.wilsoncenter.org/document/113997>

### Summary:

Transcript of Avner Cohen’s 1993 interview with André Finkelstein. Finkelstein, deputy director of the IAEA and a ranking official within the French Atomic Energy Commission (CEA), discusses Franco-Israeli nuclear technology exchange and collaboration in this 1993 interview.

### Credits:

This document was made possible with support from the Leon Levy Foundation and Carnegie Corporation of New York (CCNY).

### Original Language:

English

### Contents:

- English Transcription

## Interview with Dr. André Finkelstein<sup>[1]</sup>

This interview was conducted on 17 June 1993 in Paris, France.

Interviewer: Dr. Avner Cohen

**Dr. André Finkelstein:** I was trained as a physical chemist, I spent two years in Rochester University in New York and then I came back and joined the French Commission.<sup>[2],[3]</sup>

**Dr. Avner Cohen:** When was that?

**Finkelstein:** '53. And I was involved in isotope tritium production and then quickly the Commission was expanding very quickly, so many people had no chance to stay in the lab very long and I was called to headquarters and I was in international affairs. I float[ed] for many years in [International Atomic Energy Agency] IAEA<sup>[4]</sup> in Vienna and I was for four years as deputy director general in Vienna and then I came back . . .

**Cohen:** For Hans Blix?<sup>[5]</sup>

**Finkelstein:** Before Hans Blix, with [Sigvard] Eklund<sup>[6]</sup> in the Department of Research and Isotopes. Then I came back and I was mostly involved in nuclear safety. I retired five years ago now.

**Cohen:** How old are you?

**Finkelstein:** 70.

**Cohen:** You look very young.

**Finkelstein:** [Laughing] I don't feel that young. I was one of the last ones to retire at 65 from the Commission because I know now they are pushing people out at 60.

**Cohen:** Really?

**Finkelstein:** Too many people and most of them . . . Groundwork of the French Commission have been done and we don't know what to do anymore.

**Cohen:** Well, having said that I would like to move a little bit to the Israeli-French ties. As I understand, as you know, it started on the scientific level before . . .

**Finkelstein:** Yes.

**Cohen:** Before the political level, before the military-political level.

**Finkelstein:** Very early in heavy water,<sup>[7]</sup> uranium extraction from phosphates . . .

**Cohen:** That's right.

**Finkelstein:** And things like that. And good personnel relations between a few people on the French side and a few people on the Israeli side. [Ernst David] Bergmann<sup>[8]</sup> was a very good friend of France.

**Cohen:** He was a very good friend of?

**Finkelstein:** Of France, and he was a very good friend of Goldschmidt,<sup>[9]</sup> of [Francis] Perrin,<sup>[10]</sup> of [Jules] Gueron,<sup>[11]</sup> I met him many times and . . .

**Cohen:** And who else among the Israelis had this personal contact? The people who studied here?

**Finkelstein:** Like David Peleg<sup>[12]</sup> of course. Peleg and Tanchum, Grissim<sup>[13]</sup> who were scientific counselors in the embassy in Paris.

**Cohen:** Who is that?

**Finkelstein:** Grissim I saw him last week. He was in Paris. And of course Shimon Peres.<sup>[14]</sup>

**Cohen:** You know Shimon Peres?

**Finkelstein:** Yes, I do.

**Cohen:** Now those ties . . . even after the [Israel] Dostrovsky<sup>[15]</sup> heavy water and the phosphates, this connection, this was very much in the scientific and the personal level but it was not yet at the level of really cooperation towards a project. Is it correct to say that the major breakthrough in terms of those was in August [and] September [1956], especially September '56 with Guy Mollet?<sup>[16]</sup>

**Finkelstein:** Yes. Yes of course.

**Cohen:** How would you describe that history from your perspective?

[Gap in Tape]

**Finkelstein:** I would say there was a strong sense in France among many people, including political people, of support for Israel. They knew that Israel was in a very difficult situation and they wanted to assist as much as possible. At the same time, I would generalize a bit, and say that the general approach for the French Commission for French industry for EDF<sup>[17]</sup> was trying to export.

**Cohen:** Trying to?

**Finkelstein:** Export. And this went on for many, many years until we did some stupid exports, including [to] Iraq and the reprocessing plant in Pakistan, which was crazy.

**Cohen:** We'll come back to that.

**Finkelstein:** OK. So there was a general tendency to try to export and there was a general feeling of support for Israel.

**Cohen:** So two levels. On the one hand in the nuclear industry there was sense that . . .

**Finkelstein:** In the French Commission. Nuclear industry was very small in those years and in the government.

[Gap in Tape]

**Cohen:** Now, do you see the beginning of all that as directly related to the Suez Campaign,<sup>[18]</sup> to the Musketeer Campaign<sup>[19]</sup> or it just happened to be that it was parallel but it was not that kind of connection. Let me be more specific.

**Finkelstein:** No, I see your point.

[Gap in Tape]

**Finkelstein:** It was part of the same feeling, that Israel was a friend and an ally and you wanted to

support Israel as much as possible.

[Gap in Tape]

**Cohen:** Because the first agreement was, I think, shortly before the meeting in Sèvres in which the cooperation was actually signed.<sup>[20]</sup> This was in September. This was [a] meeting between, I think, [Pierre] Guillaumat,<sup>[21]</sup> Perrin . . .

**Finkelstein:** [Correcting Cohen's pronunciation] Guillaumat.

**Cohen:** Guillaumat. Perrin, Peres and Bergmann, and then it was . . . it moved into some kind of agreement.

**Finkelstein:** I don't think Goldschmidt told you the story but you know the French Commission is what we call . . .

**Cohen:** Commissariat.

**Finkelstein:** Commissariat à l'énergie atomique [CEA],<sup>[22]</sup> which is like a board of governors. And it includes people from outside and representatives from major departments and the representative from the Army was General Lavau and when the project was discussed inside the committee General Lavau said, he was representing the army, "Well fifty-percent of the American physicists are Jewish. They are certainly giving all their secrets to Israel; if we have a good agreement with Israel we will get access to American secrets," which was stupid of course.

**Cohen:** This was an argument?

**Finkelstein:** Did Goldschmidt told [tell] you that story?

**Cohen:** No, but I think Pierre Péan<sup>[23]</sup> told the story.

**Finkelstein:** Partly I guess. You know Péan's book came out just before our President Mitterrand<sup>[24]</sup> went for his first visit to Israel? And he sent copies of his book to all the ministers, all the top people going to Israel with the president and nobody noticed there is something new in the book.

**Cohen:** Really?

**Finkelstein:** Nobody. It fell completely flat. It's amazing. Péan was furious.

**Cohen:** Because I think the book is very interesting. I think the book is the first . . .

**Finkelstein:** But the only thing which comes out which was new is the reprocessing plant.

**Cohen:** But he also . . .

**Finkelstein:** Although the . . .

[Cohen and Finkelstein speaking over each other]

**Finkelstein:** New details being published . . .

**Cohen:** That's right.

**Finkelstein:** The man who told Péan about this was Galley.<sup>[25]</sup>

**Cohen:** Or Robert Galley.

**Finkelstein:** Robert Galley who built the plutonium plant in Marcoule.

**Cohen:** Saint-Gobain?<sup>[26]</sup>

**Finkelstein:** No, it was French commission.

**Cohen:** Oh this was the G-2 or the G-3?

**Finkelstein:** No, no, the plutonium extraction plant in Marcoule. Galley was under commission. It was built by Saint-Gobain but under the orders from the commission and Galley was in charge. He was anti-Semitic.

**Cohen:** He's anti-Semitic. [Laughs] Now what was his role later on in the reprocessing plant for Dimona?

**Finkelstein:** Very limited I guess.

[Gap in Tape]

**Cohen:** You were involved. When [did] you begin to know about this work?

**Finkelstein:** I was working with Goldschmidt in those days in international affairs, so I was partly informed.

**Cohen:** Partly?

**Finkelstein:** Partly.

**Cohen:** What aspect?

**Finkelstein:** [Unclear]. Can you turn it off?

**Cohen:** What?

**Finkelstein:** Can you turn it off.

**Cohen:** Yes.

[Gap in Tape]

**Finkelstein:** Government official.

**Cohen:** Oh yes.

**Finkelstein:** So it makes a big difference.

**Cohen:** I don't think the government of Israel should acknowledge anything at this point. But I think that the crazy idea of secrecy today which . . . it's much more than is needed.

**Finkelstein:** They are far more secret than most countries. Some reasons I can understand some reasons I do not understand.

**Cohen:** I think I do understand. I think it's from the time and that is what I would like to . . .

**Finkelstein:** It's a tradition.

**Cohen:** That's right.

**Finkelstein:** It used to be like that in France.

**Cohen:** That's what I would like to hear because I think that Shimon Peres and David Peleg and my friend Shalheveth Freier,<sup>[27]</sup> you know Shalheveth.

**Finkelstein:** [Unclear]

**Cohen:** He's a good friend of mine.

**Finkelstein:** He's a wonderful man.

**Cohen:** He's a wonderful man. You know all these people learned this secrecy from, in part, from French, not from America, because as French . . .

**Finkelstein:** Both, both.

**Cohen:** Because [the] French went nuclear, and I'd like your interpretation at more length, French went nuclear by not telling herself she's going nuclear until it was very close to the final thing and that was the decision.

**Finkelstein:** I can give you my opinion on that. Do you [want] to discuss it now?

**Cohen:** Very much.

**Finkelstein:** When the French Commission was created from this ordinance signed by de Gaulle.<sup>[28]</sup>

**Cohen:** When was that?

**Finkelstein:** It was '48 and it said that the French Commission will be responsible for all applications of nuclear energy including military uses. Nobody said anything about them going nuclear at that time. In fact it was pushed by the people in the French Commission and by a few people in the French Army. Very few.

**Cohen:** Buché?

**Finkelstein:** [Correcting Cohen's pronunciation] [Albert] Buchalet.<sup>[29]</sup>

**Cohen:** Buchalet.

**Finkelstein:** Buchalet. Buchalet joined the commission he was in charge of the new department that was called . . .

**Cohen:** General Studies?

**Finkelstein:** [In French] Department Technique Nouvelle [New Technical Department] .

**Cohen:** Technique?

**Finkelstein:** Technique Nouvelle. No, Étú General, you're right!

**Cohen:** General Studies.

**Finkelstein:** General Studies. And its contract was to start a military program and its contract would finish after the first test, which took place in [on] February 16 in Reggane.<sup>[30]</sup> Most of the

people in the French government were in fact in favor of a nuclear program, but they knew that public opinion was rather opposed to nuclear weapons and they knew that it would take a few years to get enough fissile material and to get all the information and to get everything. So there was no need to make a statement. And in fact there was a statement [made] by [unclear name] in front of United Nations saying that France is not going to go nuclear and so on. And people in the French Commission . . . mostly Guillaumat. Guillaumat pushed very much.

**Cohen:** For?

**Finkelstein:** For nuclear weapons.

**Cohen:** What about Perrin?

**Finkelstein:** Perrin was rather against, but not completely. And Perrin told me that we should have a few weapons just to show that France was still a big power. But it's crazy to go to a quantitative program because it's too expensive. This was his view. At the same time, as a very good scientist he was fascinated by the technical programs . . . problems of the hydrogen bomb and he was interested. So, there was a very strong reluctance from a very large fraction of the French army, including [the] navy and air force of course.

**Cohen:** Money.

**Finkelstein:** Exactly so, because they knew that the budget that would go to the nuclear program would be taken out of their budget, more ships or planes or anything like that. Buchalet told me that after he left the Commission in '60 he tried to go back to the Army he was so poorly received he resigned from the Army and he joined the [unclear].

**Cohen:** He resigned from the Army?

**Finkelstein:** He resigned from the Army and joined the private industry El Compañía S.A. which was a very large construction company. He was a representative in Brazil where he had many friends. So it's very strange, because the first countries which went nuclear they did during the Second World War. For the Americans and the British, partly the Canadians who were involved, it was a matter of competing with the Germans and being the first to get the weapon. For the Russians it was the same problem to be able to get the weapon as soon as possible. After the Americans or before the Americans if possible. For France it was done in peacetime. Perrin told me that in '54 . . .

**Cohen:** Who is that?

**Finkelstein:** Francis Perrin, told me that in '54 he went to the UN with the prime minister who was [Pierre] Mendès France,<sup>[31]</sup> because he was supposed to discuss nuclear matters in the General Assembly. They would not discuss but Perrin went to Washington . . . But Mendès France went to Washington to discussions and Perrin told me that on the plane flying back to Paris Mendès France spoke with him for a long time and told him he was in Washington and it's exactly like a meeting of gangsters. Everyone is putting his gun on the table, if you have no gun you are nobody. So we must have a nuclear program. And this was, and in fact . . .

**Cohen:** Nuclear weapons program.

**Finkelstein:** Nuclear weapons. And in fact Mendès France signed the first order in December '54.

**Cohen:** This was the five years study?

**Finkelstein:** No this was the decision to go nuclear.

**Cohen:** Yeah, but it was not to have a bomb, it was to study.

**Finkelstein:** Oh yes! It was to have a bomb and some mines.

**Cohen:** To have a bomb what?

**Finkelstein:** And some mines.

**Cohen:** Some marines?

**Finkelstein:** Some mines, yes. And there was a very big meeting, maybe Goldschmidt told you about it, in December of 20 . . . '54, maybe it was [the] 24<sup>th</sup> of December '54 just before Christmas and Mendès France was chairing the meeting and he had about 40 people around. And Guy Mollet told me, "I spoke in favor of a nuclear bomb, [a] French nuclear bomb, and Perrin was very nice. He didn't speak for it, but he didn't speak against it." So the decision was made but the Mendès France['s] government . . .

**Cohen:** Did not . . .

**Finkelstein:** [They] lost the confidence vote in the National Assembly January '55, and the decree went, and then everyone got out the safe . . . the prime minister . . .

**Cohen:** So it never became . . . official.

**Finkelstein:** . . . bill.

**Cohen:** Never became [a] bill.

**Finkelstein:** You see my feeling that most of the French, good political people, were in favor of nuclear weapons for France. They knew that this was the only way to still pretend [that] we were a big power. At the same time they knew it would take some time. It was not very popular with public opinion.

**Cohen:** Why? Communists?

**Finkelstein:** Communists and people were for peace and they were afraid of nuclear weapons and so on. So why make a decision, why make an official announcement several years in advance of the first test?

**Cohen:** But it was not even a decision for France, [an] internal decision . . .

**Finkelstein:** Oh yeah.

**Cohen:** It was inertia. It was [an] understanding.

**Finkelstein:** It was under . . . I took it too far . . . declare our first test . . . H-bomb.

[Gap in Tape]

**Finkelstein:** You see, in May '54 the prime minister was [Joseph] Laniel [\[32\]](#) and he started discussion to . . .

**Cohen:** This was before Mendès France?

**Finkelstein:** This was before Mendès France.

**Cohen:** And Perrin did not oppose.



**Finkelstein:** No. In the . . . October '54 there was a, what we call a décret [a decree], which was a government order [mumbling] don't know what it is, creating a committee for military application.

**Cohen:** That's right. As part of the CEA?

**Finkelstein:** Inside the CEA, but with people from the outside of course.

**Cohen:** The military?

**Finkelstein:** In May '55 the prime minister was at Gafoure and [the] budget was transferred from the army to the French Commission to support the military program.

[Gap in Tap]

**Finkelstein:** And in November '56, this was under Guy Mollet, there was a protocol between the army and the CEA for the general responsibility, who would do what. The French CEA would produce nuclear material, make the weapons and the army would test the weapons and would be responsible for the testing site.

**Cohen:** So this was actually the decision already.

**Finkelstein:** It was already decided but it was never published. In December '56, still under Guy Mollet, there was a committee on military application. This was a decree creating this committee.

**Cohen:** I thought you said the committee on military application was in the CEA in '55.

**Finkelstein:** Nope, it was a commission first, but it was already started.

[Gap in Tape]

**Finkelstein:** February '57, preparation for the test was given to a special study group.

[Gap in Tape]

**Finkelstein:** In February '58, the prime minister . . .

**Cohen:** Gaillard?<sup>[93]</sup>

**Finkelstein:** Felix Gaillard.

[Gap in Tape]

**Finkelstein:** He create[d] a command, [an] inter-army command, for special arms.

**Cohen:** This was announced? It was just . . .

**Finkelstein:** No. In April '58, Felix Gaillard again makes a decision that the first test would take place in the first trimester of '60.

**Cohen:** And this was announced?

**Finkelstein:** This was not announced.

**Cohen:** Oh, it was not announced.

[Gap in Tape]

**Finkelstein:** So you see . . .

**Cohen:** Now how [about] the convergence with those events with the cooperation with Israel? How do you see . . .

**Finkelstein:** There is no connection, no connection at all.

**Cohen:** For example, let me ask you specific[ly].

**Finkelstein:** I don't see any strong connection [between the French and the Israeli decisions].

**Cohen:** You don't think that those people who felt we should do it, and especially after the Sinai campaign, Sinai campaign was, according to Péan and its very well know. McGeorge Bundy<sup>[34]</sup> makes a big deal in his book.

[Personal conversation excised] **Cohen:** And McGeorge Bundy says that the humiliation in '56 was a very major reason for Guy Mollet to change his mind. It's correct in your mind?

[Gap in Tape]

**Finkelstein:** I would say it was an added incentive.

**Cohen:** Strong incentive?

**Finkelstein:** It was a strong incentive, yes.

**Cohen:** Now according to Péan, Péan, Guy Mollet felt [that] because Israel has to withdraw and Ben-Gurion has to withdraw and that there were [Nikolai] Bulganin<sup>[35]</sup> threats that he owns something to Israel and him.

[Gap in Tape]

**Finkelstein:** Probably. Probably but also there was . . . I believe there was a strong feeling of support for Israel, before the campaign.

**Cohen:** Yeah, because something happened. You see all the documents, the agreement in September that Guillaumat and Peres, and Bergman and others have, they talk about small reactors, like the EL-3<sup>[36]</sup>.

**Finkelstein:** Yes.

**Cohen:** They talk about small reactor . . .

**Finkelstein:** Right.

**Cohen:** Perhaps to have it in Rishon Le-Zion or Rehovot, to have it close to Weizmann Institute. But the final thing, during '57, in the final discussion in '57 it become, it became Dimona. Dimona is, you call it research reactor, but Dimona is basically a production reactor.

**Finkelstein:** It's a medium size reactor.

**Cohen:** It was said to be 24[MW] for the very beginning, it was known to be 40 [MW] and the Israelis ask to be able to make it bigger if there would be need for that. Do you recall, do you have a sense what happens between September '56 . . .

**Finkelstein:** No, I don't know.

**Cohen:** Because Peres got the [final] agreement at the last day, literally the last day of the Bourges-Maunoury<sup>[37]</sup> government.

**Finkelstein:** Oh.

**Cohen:** He actually ran with the documents in effect they told him that they signed it. But in even the government is no longer the government.<sup>[38]</sup>

**Finkelstein:** It was a strange time. You see at the same time, I don't know if you remember that story that Bourges-Maunoury and a few people, we were starting to consider building Pierrelatte.<sup>[39]</sup>

**Cohen:** Building?

**Finkelstein:** Pierrelatte. To produce enriched uranium. We knew it would be very expensive. We took tax of the French budget to the mostly [inaudible], and we took tax also of the industry and the technical capability of French industry and some people got the idea to involve Germany and Italy and to have a tripartite agreement between France, Germany and Italy to build Pierrelatte. To get money and industrial support from both other countries.

**Cohen:** For a weapon or power?

**Finkelstein:** No, no Pierrelatte to produce highly enriched uranium for a weapon. And to get information, of course, to Germany and Italy. It was a top secret agreement, it still is. We may have published a few things.

**Cohen:** Oh, it was written about.

**Finkelstein:** Not too much yet. And . . .

[Gap in Tape]

**Finkelstein:** We are looking for support. And we knew we were going nuclear, we knew it would tax the French budget and French industry and were looking for an exchange. And [unclear name] was very much involved in it. And as soon as de Gaulle came back to France in '58, this is crazy. And some people say this is why Siobhan must have got a good job under de Gaulle, because he had been so much involved in that project. And you see in those days we were looking . . .

**Cohen:** This [were] two secret projects, Dimona and this one?

**Finkelstein:** Yes. Dimona came to reality so when there was an agreement signed . . .

**Cohen:** It was signed?

**Finkelstein:** A copy is saved in the French Commission, it was never . . .

**Cohen:** Nothing was materialized?

**Finkelstein:** It was very strange because we . . . I was taking part in in . . .

[Gap in Tape]

**Finkelstein:** A group of historians [was] working on the history of nuclear programs and we discussed this tripartite agreement and we found out that it was top secret in France. It was very secret in Germany but the Germans spoke with the Americans about it and the Italians spoke to anybody about it. [Laughs]

**Cohen:** Who was in Germany, Franz Josef Strauss? [\[40\]](#)

**Finkelstein:** Yes.

[Gap in Tape]

[Excised]

**Cohen:** Now I understand, Israeli project started in a very, you know, like the French project started people read Smith report [\[41\]](#) knowing almost nothing what to do. In fact there is a story that General Buchalet and another person was just sitting there with the Smith report thing saying, "Where should we go?"

**Finkelstein:** In the French army we had the secret documents in our safes and some of the secret documents were just pure decoys like [unclear] reports about the American project.

**Cohen:** Now there was a sense that perhaps the Israelis could help?

**Finkelstein:** No I don't think so.

**Cohen:** In terms of design? In terms of, the Israelis may know what the General said they know everything from the Americans. All the prominent scientists were Jewish . . .

**Finkelstein:** I don't believe so. Without being . . . wanting to make any disparaging remarks . . . it is a small country with a few top scientists. I don't believe we were expecting any scientific or technical assistance. No.

**Cohen:** Did you know at the time that there is already [an] Israeli small group of scientists who begin to study and begin look for military applications?

**Finkelstein:** Yes, but this was true in every country. It was true in Switzerland . . .

**Cohen:** It was true in where?

**Finkelstein:** It was true in Switzerland, it was true in Sweden, I am sure it was true in Germany too.

**Cohen:** Yeah.

**Finkelstein:** You cannot prevent people from working on paper.

**Cohen:** Yeah. Now, the reactor get[s] bigger in '57 and for some reason the discussions, until the signature takes about, almost a year, from October '56 until September '57 [when] it is signed. Do you have any sense what actually happening? What is the discussion?

**Finkelstein:** It was the messy French administration, I would say. Mostly . . .

[Gap in Tape]

**Finkelstein:** Inability to make decisions. Mostly.

**Cohen:** Because there were two types of agreements. I mean, there is the government to government decision, agreements. And there is the agreement between.

**Finkelstein:** Those two agreements.

**Cohen:** Those two agreements. And I think those agreements were between these companies that

were established by CEA [Commissariat à l'énergie atomique et aux énergies alternatives], right?

**Finkelstein:** Ertaud was in charge?

**Cohen:** Who was?

**Finkelstein:** Ertaud, in charge of the company, but . . .

**Cohen:** How do you spell his name?

**Finkelstein:** E-R-T-A-U-D.

[Gap in Tape]

**Finkelstein:** The financial cost to Israel was terribly high.

**Cohen:** How much was it more or less?

**Finkelstein:** I am not sure. And they had to buy two completely dilapidated ships . . .

**Cohen:** Two what?

**Finkelstein:** Israel had to buy two completely dilapidated ships from France at the same time it was part of the contract.

**Cohen:** Two ships?

**Finkelstein:** Yes. Two very old ships which were used for a few years in Israel but I don't know what happened to them.

**Cohen:** Why it was part of the contract?

**Finkelstein:** It was part of the payment from Israel to France.

**Cohen:** Oh, Israel sold ships to France?

**Finkelstein:** No, to buy it. Two very old ships.

**Cohen:** This was to hide it?

**Finkelstein:** No, no it was just one way to get more money. It was very expensive, I know it was very expensive to Israel, I don't remember the figures. I don't think I knew the figures.

**Cohen:** You think at the level of hundreds of millions? Two, three hundred million dollars?

**Finkelstein:** I don't know.

[Gap in Tape]

**Cohen:** Now . . .

**Finkelstein:** I know that Guy Mollet said that I agreed to sell a reactor, but we will sell it at a very high price. He wanted to make money.

**Cohen:** The reactor was sold by [Unclear].

[Gap in Tape]

**Finkelstein:** Probably yes. I am neutral; I have never seen the contract itself.

**Cohen:** But now . . . the Israeli reactor was EL-102.

**Finkelstein:** Yes.

**Cohen:** And this was specifically for Israel, which was different from the EL-3.

**Finkelstein:** Yes.

**Cohen:** Do you recall what were the changes, what were the specifications.

**Finkelstein:** Why, it was mostly the size.

**Cohen:** What was the size?

**Finkelstein:** Which size?

**Cohen:** Dimona.

**Finkelstein:** It was much bigger than the EL-3.

**Cohen:** Oh of course. The EL-3 was what, 10[MW], 12?

**Finkelstein:** Oh no it was about 6, 6MW.

**Cohen:** 6MW. Now the Israelis, because Péan said, and let me prove that, confirm that. Even though the agreement said 26[MW], it's actually 40[MW], how . . . recall it was 40[MW]?

**Finkelstein:** Yes, and then the Israeli increased to 40[MW].

**Cohen:** That's right. But they asked to build it with a way to be able to increase it.

**Finkelstein:** That's right.

**Cohen:** And people understood what they wanted.

**Finkelstein:** Yes.

**Cohen:** Now those issues were written in the contract?

**Finkelstein:** I don't know.

**Cohen:** Because Péan says at one point, that no one in France had a full picture because the program was so compartmentalized because there was government . . .

[End Side A]

[Begin Side B]

**Finkelstein:** They were never interested in the technical details. Final [unclear], technical or scientific. Once the project was approved it was finished for them. It was a problem for industry and the French Commission.

[Gap in Tape]

**Cohen:** The political people that approved was [were] Guy Mollet and Bourges-Maunoury.

**Finkelstein:** Yes.

**Cohen:** Now, from their perspective, why did they do it? Giving a gift to Israel? Believing that Israel needing it for its survival?

**Finkelstein:** Probably, probably. They believed that they should assist in the survival of Israel and at the same time, as I told you, we were still fighting in Algeria and there was a very strong feeling against the Arab world.

[Gap in Tape]

**Finkelstein:** We knew Israel was a part of the Middle East which was friendly to France. The same was true of the US.

[Gap in Tape]

**Finkelstein:** And . . .

**Cohen:** But it was not [that] Israel provided some assistance to France, as France felt that . . .

**Finkelstein:** No, I don't believe so.

**Cohen:** Now there were some rumors that there were Israelis scientists [working in France first] in the French first, ties . . .

**Finkelstein:** There were some Israeli scientists working on, what you call, a charges aux creuse rocket type of explosive.<sup>[42]</sup>

**Cohen:** A what? The rockets? The missiles?

**Finkelstein:** The missile, but they were what we call the chemical explosives you use in rockets and the way to dispose them. And there was an institute in Saint Ouen [in the] east of France, where there were a few German scientist working on rockets during the last war and a few Israeli scientists too.

**Cohen:** And what about the Sahara nuclear test?

**Finkelstein:** No.

**Cohen:** You don't think there were Israelis there?

**Finkelstein:** I don't believe so. I'm not sure but I don't believe so.

[Gap in Tape]

**Cohen:** There are rumors that there were, but...

**Finkelstein:** Maybe one was indicted but I don't know. I don't know.

**Cohen:** But this was conducted not by the CEA, but by the army.

**Finkelstein:** Well the army was responsible for the testing site, but the French Commission got everything ready, assembling the weapon . . .

**Cohen:** Implosion.

**Finkelstein:** And getting all the equipment to monitor the test. You know that when we made our

first test in Reggane, with planes going through the cloud to pick up debris, just to decide what the yield was. When the cloud got to the Libyan border, the Americans were still in Libya in those days, and they saw American planes picking up debris. And the Americans were very nice to give us a phone call and say, "Congratulations, your yield was so much," because they knew so much more than we did in those days.

**Cohen:** It's interesting. I didn't know that. Now, now to the . . .

**Finkelstein:** You see in the same way we got a lot of technical assistance not for our program itself, but we got a lot of assistance from the US.

[Gap in Tape]

**Finkelstein:** When the political relations between US and France were very difficult, under de Gaulle for instance, but the scientific and technical contacts were perfect, we were very good friends, and we would go to the laboratories in the US.

**Cohen:** Los Alamos?

**Finkelstein:** Los Alamos not so much, but all the [unclear], and get a lot the information, I went many times. And we could come back and the information we got was not classified but it was not published yet and you know that publication time is at least six months. And saving six months would pay thousands of time for the cost of the trip. And our American friends knew exactly what they could tell us and what they should not tell us. They knew exactly, but the relations were perfect.

[Gap in Tape]

**Cohen:** Ullman says that actually even this. [\[43\]](#)

**Finkelstein:** He is wrong.

**Cohen:** He is wrong? Really?

**Finkelstein:** We got very little assistance from the US.

**Cohen:** Because . . .

**Finkelstein:** We got some assistance for the measurements you make after a test. And we got some assistance for the safety of nuclear weapons because nobody wants an accident. So we got some information.

**Cohen:** PAL?

**Finkelstein:** Hm?

**Cohen:** How about PAL? Permission Action Link. [\[44\]](#)

**Finkelstein:** All the general safety measures you have to take to prevent an exposure or prevent an accident and the Americans told us... I can tell you a story.

[Gap in Tape]

**Finkelstein:** . . . [For the] first test, the minister in charge of the French commission was Pelevsky and I have a friend who was in the American embassy . . .

[Gap in Tape]



**Finkelstein:** In those days he was a scientific advisor. He went to see Pelevsky with another member of the embassy and told him you made your first test. You know what we cannot give you and technical assistance for your weapons program. But at least we should like to assist with the safety of nuclear weapons because it is important. Pelevsky said, "Very good idea, I approve completely, but I am not going to tell de Gaulle something like that. I would get fired immediately." But it took another ten years before we had an official agreement.

**Cohen:** Really? I did not know that. That's interesting.

**Finkelstein:** But we got some assistance and fifty [inaudible] is going far too far.

**Cohen:** You know the Americans ask you, almost in the middle of the 1960s, about the Israelis and the French flatly denied.

**Finkelstein:** Of course.

**Cohen:** What was . . .

**Finkelstein:** There was a famous article by *The International Herald Tribune* about the camel hair coat. Do you remember this one?

**Cohen:** What was the story?

**Finkelstein:** It is the name of the columnist in the last page of *The Herald Tribune*. The man who's writing about nuclear arms, [I] forgot his name, when he wrote about them, an American coming to a place near Beersheba said, "Could I come visit the textile industry?" And what would you like, a camel hair [fur] coat? Yes! Very thick walls at summer [inaudible].

**Cohen:** Do you recall yourself any of the stories about the secrecy and security of the Israeli project? Interested in the way it was compartmentalized, it was separated from the rest of CEA activity?

**Finkelstein:** I don't know too much.

[Gap in Tape]

**Finkelstein:** Everything is secret in Israel.

**Cohen:** [Laughs] Well, but do you recall the French procedure, some interesting stories about the way . . .

**Finkelstein:** I can tell you one story that Ertaud told me.

**Cohen:** Who told you?

**Finkelstein:** Ertaud. The man you named . . . Ertaud told me that when de Gaulle came back to power he wasn't so much against Israel but he wanted to make peace in Algeria so he had to make something to appease the Arabs and he said we have to stop that project immediately. The orders came from Paris, you have to get rid of all the personnel in your company. To obey the orders, of course. The same day the Israelis started another company and took back all the same people to finish the project. Even under de Gaulle it could be done! [Laughs]

**Cohen:** And it did continue quite a long time.

**Finkelstein:** Yes.

**Cohen:** Even though de Gaulle . . . but de Gaulle . . . Do you think de Gaulle somewhat knew it

continues but had to say it had to be stopped?

**Finkelstein:** That is a possibility, he probably knew about it.

**Cohen:** Because [Maurice] Couve de Murville <sup>[45]</sup> reached an agreement with Peres [that] government to government assistance will stop and we are not going to supervise any more, you know the reprocessing plant, but I think he allowed Saint-Gobain to finish some of the contracts.

**Finkelstein:** Oh probably, probably. But you see they had to take an official position to appease the Arab governments and to prepare for peace in Algeria, but at the same time they knew very well that the project would continue, I guess.

**Cohen:** Now, how did the reprocessing plant was dealt with, I mean, was it part of the official contract government to government or was it simply with Saint-Gobain?

**Finkelstein:** I am not sure. I don't believe it could be built without government approval.

**Cohen:** No I know there was approval for that but the deals of that . . .

**Finkelstein:** I don't know I have never seen the contract.

[Gap in Tape]

**Finkelstein:** It is still highly classified. [Laughs]

**Cohen:** Yes, I . . . But, I mean there is no question about it anymore . . .

**Finkelstein:** No.

**Cohen:** There is no, any, basically the story is out. I mean the history of stories is interesting. You see a lot of people think that Peres learned to deal with France and also to deal with Israel [itself] as the French people deal among with themselves over this nuclear business in terms of secrecy in terms of not having official decisions about that, making momentum without announcing anything. Make sense to you?

**Finkelstein:** Yes.

[Gap in Tape]

**Finkelstein:** At the same time I would say this is true for any military matter in military.

**Cohen:** The nuclear project was much more [secretive?] than any other project.

**Finkelstein:** Yes.

[Gap in Tape]

**Cohen:** Have you been in Dimona? Have you seen Dimona?

**Finkelstein:** Yes.

**Cohen:** When was that?

**Finkelstein:** Ten years ago?

**Cohen:** Oh ten years ago? In 1980?

**Finkelstein:** About . . . maybe 15 years ago, I am not sure.

**Cohen:** '75.

**Finkelstein:** I had lunch with the head of Dimona during the Gulf War [1991-92]. I was in Israel during those days.

**Cohen:** During the Gulf War you were too?

**Finkelstein:** I was in Israel in those days.

**Cohen:** Privately or . . .

**Finkelstein:** Privately.

[Personal conversation excised]

**Finkelstein:** '73, beginning '74. And Chirac was in Iraq and signed a new contract for oil and, of course at the same time he was trying to sell as much as possible to pay for the oil and the Iraqis told him we would like a reactor like the ones you have in Marcoule, gas-graphite, natural uranium and so on. And without consulting anybody Jacques [Chirac] said, "Yes, of course," and they signed the protocol.

**Cohen:** This was a G1 . . .

**Finkelstein:** G2 or 3<sup>[46]</sup> which is a plutonium producing . . . military program and Chirac went back to Paris and said I signed wonderful contracts and so on. And in those days the head of the French Commission was Andre Giraud.<sup>[47]</sup>

**Cohen:** He's still alive?

[Excised]

[Gap in Tape]

**Finkelstein:** People in the EDF told Boiteux, "Giraud is selling a reactor to Iraq. Maybe he is trying to push gas-graphite again in France and we don't want it." So Boiteux went to see the President Giscard d'Estaing.<sup>[48]</sup> He could tell Giscard d'Estaing that he didn't trust Giraud.

**Cohen:** Couldn't tell Giscard d'Estaing what?

**Finkelstein:** That he didn't trust . . .

**Cohen:** Chirac?

**Finkelstein:** No. Giraud, the head of the French Commission, but he told Giscard d'Estaing you see we are sending a gas-graphite reactor to Iraq but this is the type of reactor we are making our military plutonium with, maybe it is not very safe.

**Cohen:** Maybe, [laughs] maybe.

**Finkelstein:** And Giscard said "Oh, I agree, and the orders came from Élysée [saying that] we don't sell gas graphite reactors to Iraq anymore, and you've got to find something as expensive as possible to sell Iraq." And the French Commission said that most expensive piece of hardware we can sell is a copy of a, of [unclear, in French] our last research reactor which is very expensive and then when they approached . . .

**Cohen:** That's not a type of the EL-3 and those?

**Finkelstein:** It's a much bigger one. It's not the same type. It's a pool type reactor. [\[49\]](#)

**Cohen:** It's what?

**Finkelstein:** It's a pool type reactor. And when they approached the Iraqis they didn't want these because they knew there were no physicists to . . . It takes a large team of good physicists and [unclear] people, neutron people, and so on. They knew they had no use for this. And we had to push very hard . . .

**Cohen:** They wanted plutonium?

**Finkelstein:** No, they didn't realize at the beginning. If they couldn't get the gas graphite they were not interested in those series. So we had to push and then they accepted that series. It was crazy, it's a crazy story. And the point is that nobody . . .

**Cohen:** Do you think they were able to convert it, if they wanted, within a few years to get the plutonium? It's more complicated to get the plutonium for those or . . .

**Finkelstein:** No you just put natural uranium [inaudible], it's in a pool so you have plenty of space and you put natural uranium and you reprocess your natural uranium and you use a neutron [unclear].

**Cohen:** It's that not difficult?

**Finkelstein:** No, no it's not difficult. Of course we say that as long as we were building the reactor and starting the operation there would be French technical people on the spot.

**Cohen:** That's for a while.

**Finkelstein:** And they would know what was going on. But of course it was crazy. You see the point is, again, the pressure on French industry, and the French Commission, and the IDF was tied to exports and mak[ing] money. Nobody was considering the political problems, and after we got hell from the US, mostly for the Pakistani reprocessing plant. They created a committee on the export of nuclear material, chaired by the president, all the ministers . . .

[Gap in Tape]

**Finkelstein:** And I would say all those mistakes were not made deliberately for political reason, it was just French inefficiency.

**Cohen:** You really think so?

**Finkelstein:** Oh yes.

**Cohen:** Because some of these mistake are so stupid that everybody who has a little bit political understanding in mind think that one should be very stupid to make those mistakes. Unless one is lenient of . . .

**Finkelstein:** On no, no, I believe it was mostly inefficacy. Nobody was considering the political problems.

**Cohen:** How come? I mean unless French is so irresponsible on nonproliferation, which France was quite irresponsible on nonproliferation. The whole attitude of French . . .

**Finkelstein:** We have . . .

**Cohen:** Until you sign it takes a long time.

**Finkelstein:** We have been the most irresponsible country on nonproliferation.

**Cohen:** I will never quote you, [that's] what you said.

**Finkelstein:** Don't quote me, but it is true!

**Cohen:** It is true, it's very true.

**Finkelstein:** Besides Canada. Canada sold . . .

**Cohen:** India?

**Finkelstein:** A heavy water reactor to India. Yes. [\[50\]](#)

[Gap in Tape]

**Finkelstein:** But it was irresponsible for Canada to sell a heavy water reactor to India. In fact, when we discussed nonproliferation the man in charge of the Russian commission was in those days Emelianov . And one day we had lunch with him in Paris and in those days, before China turned nuclear, the Russians very much against India on this. And Emelianov told us, "There's no problem, you take care of your satellites, we take care of our satellites." And they were taking very good care of their own satellite and we told him we could not do the same in Western Europe. [Laughs]

**Cohen:** You think in terms of . . . who were the people, if you try and look at it historically, the people on the French side who were very significant in terms of the French-Israeli relationship both on the technical, scientific and political level, if you had to try to summarize it?

[Gap in Tape]

**Finkelstein:** Perrin, Francis Perrin.

**Cohen:** What was his attitude and how do you understand it?

**Finkelstein:** Perrin was very much in favor of Israel, I don't know why. I can tell you I was working with Perrin at the beginning of the Six-Day War. [\[51\]](#) And for the first time in my life I went to see him and he spoke for ten minutes without being interrupted, saying [that] it was a scandal when de Gaulle [unclear] and so on and we cannot accept it but [unclear]. And then Perrin told me, "But I agree complete[ly], you and I already made a few phone calls to prevent some of the embargo." He was always a very good friend of Israel.

**Cohen:** In the nuclear thing he made a few calls or in the other . . .

**Finkelstein:** General field I would guess, because it was not nuclear in those days.

**Cohen:** So it was Perrin, who else?

**Finkelstein:** Gueron, Goldschmidt.

**Cohen:** Who was Gueron?

**Finkelstein:** Jules Gueron, he was one of the Frenchmen who was in Canada during the war. He was in charge of chemistry in the French Commission. Horowitz of course.

**Cohen:** What is the story of Horowitz? Jules Horowitz? [\[52\]](#)

**Finkelstein:** He was in charge of the reactor division.

**Cohen:** He was what?

**Finkelstein:** He was in charge of the reactor division in the French Commission.

**Cohen:** And it was his people who become the start up.

**Finkelstein:** Yes, [unclear name].

**Cohen:** Gehrah was in charge of?

**Finkelstein:** Gehrah was, I believe he was under Horowitz during those days.

[Gap in Tape]

**Finkelstein:** Guillaumat was in favor, just to make money.

**Cohen:** When he was minister of defense or when he was in charge . . .

**Finkelstein:** When he was chairman of the Commission.

**Cohen:** He was defense after that?

**Finkelstein:** After that. He was defense when . . .

**Cohen:** End of de Gaulle I think.

**Finkelstein:** End of de Gaulle, '63 or '64. He was a . . . you know he went to Algeria, and he saw the revolt in Algeria and he came back and told de Gaulle "You have to give up, those people are too strong." And de Gaulle fired him.

**Cohen:** Jacques Soustelle?<sup>[53]</sup>

**Finkelstein:** Yes, yes. [Mumbling]

[Gap in Tape]

**Finkelstein:** And the people in the Foreign Affairs department were against, as usual.

**Cohen:** Couve de Merville?

**Finkelstein:** Couve de Merville was not completely informed. And there is a tradition in the Quai d'Orsay . . .<sup>[54]</sup>

**Cohen:** To oppose, to be pro-Arab.

**Finkelstein:** To be pro-Arab, yes, it's an old tradition.

**Cohen:** Steady . . .

**Finkelstein:** Even if it doesn't work we are still pro-Arab. And I was surprised; we had so many colonies or protectorates in the Arab world and we had so many people working in those countries that we should know. All the people who were involved in the French colonies are dead or retired and the young ones don't know, they don't understand the Arab world. They have the old tradition to be anti-Semitic too; there is that tradition in the Quai d'Orsay.

[Gap in Tape]

[Excised]

**Cohen:** Now I ask you about the EL-102, so what, beside the size what was the Israeli specification for that?

**Finkelstein:** I don't know the details.

**Cohen:** And the work with Carle and with Horovitz on this issue.

**Finkelstein:** Yes.

**Cohen:** They, you know they had a special company that they built. Let me just remind you what, this is bad translation of Péan's book<sup>[55]</sup> in English, actually it is kind of illegal. Even if it was done . . . . You know who did it? The US Government. There is a Congressional Research Service . . . .

**Finkelstein:** Oh I see, I see.

**Cohen:** There are two people who just . . . it's not very accurate, but it's OK. He mentioned this, this is quite interesting pages. The client name used by the CEA to describe the Israeli Atomic Energy Commission installed permanent area in Paris at 120 Boulevard . . . .

**Finkelstein:** [Unclear]

**Cohen:** Colonel Pratt, Manes Pratt,<sup>[56]</sup> I am sure you knew him.

**Finkelstein:** No.

**Cohen:** No? Who directed the construction of the Dimona complex also rapidly established direct contacts with industrialists at the various head of the CEA. He asked one of them, one of the other for a change, asked [unclear] Paris to intervene. Professor Bergmann, who is chief, often went to Paris but Pratt was certainly alone and in having total and exact view of the file. When in the beginning of '58 the first bulldozers start working at the Dimona site, the plans for the nuclear reactor to start production of 10-15 kilograms of plutonium per year. That should be already . . . .

[Gap in Tape]

**Cohen:** That should be 40[MW] I think. Maybe what?

**Finkelstein:** A bit more.

**Cohen:** A bit more.

[Gap in Tape]

**Cohen:** I think in the spring of '57 Pierre Tarangé

**Finkelstein:** Tarangé. He's dead now.

**Cohen:** Industrial director of the CEA established contact with Roger Julie and [unclear] This big mouth of difficult characters was the director of the ELCN, the SC . . . .

**Finkelstein:** La Société alsacienne de constructions mécaniques [SACM].<sup>[57]</sup>

**Cohen:** Which was then enjoying a serious love affair with the CEA.

**Finkelstein:** Yes, they built Marcoule.

**Cohen:** That's right, that's right. Julie appeared to be the man capable of completing this operation which called for a great mastery of men. The SACM was chosen as the advanced architect for the Dimona project under the leadership of the CEA. The SACM would be in charge of recruiting subcontractors . . .

[First Tape Ends]

[Second Tape Begins]

**Cohen:** For the entire EL-102 operation the CM would go underground in its relationship with Israel, with subcontract, took the name SCFE, Research Company for Financing and Enterprise. Conga-Julie recorded those who would take part in this Israeli invention. In other words, what he was saying is it was completely separate from what they were doing. It took new name of that . . .

**Finkelstein:** It was partly, also for the [inaudible].

**Cohen:** American . . . discovered . . . but also to avoid too much attention here in France.

**Finkelstein:** Yes, yes.

**Cohen:** Letterhead, stationary was printed in the name of SCFE. A false address was given. Mr. Julie explained all the secrecy proceeding to Mr. Campitindino . What was that?

**Finkelstein:** There was one Champontine, were the financial director in the French commissioner but it was Champontine, CH.

**Cohen:** Maybe it was the same one. It began at Beersheba, employee working at EL-102. Even Nala said SCFE [unclear] work should not be addressed to Israel but to another country in Latin America. The same procedure applied to letters sent from the Beersheba campus. Then he talk[ed] about . . .

**Finkelstein:** Pascal. Yeah.

**Cohen:** Pascal.

**Finkelstein:** Pascal was the deputy to Tarongé.

**Cohen:** So he was in charge . . . in Beersheba?

**Finkelstein:** No, no he was deputy to Tarongé in the French commission he was the man who finished building the Marcoule.

**Cohen:** What is the [Service de Documentation Extérieure et de Contre-Espionnage] SDECE [\[58\]](#) and the [Direction de la Surveillance du Territoire] DST, [\[59\]](#) that is French security?

**Finkelstein:** Militarie . . . The equivalent of Mossad. [\[60\]](#)

**Cohen:** The CIA?

**Finkelstein:** Equivalent of the Mossad.

**Cohen:** Mossad. He said the . . .

**Finkelstein:** External spying, internal counter-espionage.



**Cohen:** In other words, we are in the business of knowing.

[Gap in tape]

**Cohen:** What was your sense at the time of the Israeli brain behind it? Both in terms of organization and then in terms of the science.

**Finkelstein:** I don't know.

**Cohen:** I think Peres was the organization man . . .

**Finkelstein:** And Bergmann probably.

**Cohen:** And in terms of the science.

**Finkelstein:** I don't know. No. I was not involved so.

**Cohen:** Now, is there, is there in France a law about nuclear energy now? Like the Nuclear Energy Bill, McMahon Bill<sup>[61]</sup> of '46 in America and then '54 that makes . . . America after the Manhattan Project came with a law.

**Finkelstein:** No, no we don't have the equivalent of the law.

**Cohen:** To the present day?

**Finkelstein:** No.

**Cohen:** That's interesting.

**Finkelstein:** But I told you we had that committee on nuclear exports which is going to examine, to check all the proposals of exports, nuclear exports.

**Cohen:** From now on?

**Finkelstein:** From '60 . . . no, from '74 or '75 on.

**Cohen:** And what are they going to do? What actually happened?

**Finkelstein:** No, any export project must pass before this committee. You see it's shared by the president and it's approved or disapproved. But at least it has some political control now.

**Cohen:** This wasn't the case with the Pakistan . . .

**Finkelstein:** And it came after we got hell from the US over Pakistan . . . [Unclear]

**Cohen:** And the deal was Pakistan actually just took advantage of French naiveties eh?

[Gap in tape]

**Finkelstein:** Yes, because it crazy for a country like France to take such a political risk to make a hundred million francs. I mean it's crazy. And it was so [unclear] that Pakistan had this small reactor from Canada. There was no industry or economic justification to [for] a reprocessing plant. It was obvious it was for a military project.

[Gap in tape]

**Cohen:** It was cancelled when?

**Finkelstein:** '75, I think.

**Cohen:** '75.

**Finkelstein:** Very quickly, but there had already most of the blueprints and most of the equipment . . .

**Cohen:** Even the Pakistan, because of that, never went into reprocessing, instead went into . . .

**Finkelstein:** Enrichment.

**Cohen:** Enrichment, with the centrifuge.

**Finkelstein:** I don't know what . . . mistaken [inaudible] . . . proposed . . . plutonium plant no. But we had also a deal coming with Korea.

**Cohen:** Eh!

**Finkelstein:** Which would have bought some.

**Cohen:** At the same time?

**Finkelstein:** For four reactors.

**Cohen:** This never went anywhere?

**Finkelstein:** No.

**Cohen:** North Korea was always interested in plutonium, they never . . .

**Finkelstein:** Of course, of course.

[Excised]

[Tape ends]

<sup>[1]</sup> This transcript has been edited lightly for readability purposes and annotated for convenience. Small sections may have been excised to protect confidential sources and personal information. These excisions are explicitly marked in the text.

<sup>[2]</sup> Recording began after the start of the interview.

<sup>[3]</sup> The Commissariat à l'énergie atomique (CEA) was created in 1945 under Charles de Gaulle to oversee France's civilian and military nuclear activities.

<sup>[4]</sup> The International Atomic Energy Agency was established in 1957 with the dual mission to seeking to encourage the peaceful use of nuclear power while preventing the use of nuclear weapons.

<sup>[5]</sup> Hans Blix (1925- ) is a Swedish diplomat and politicians who was the Swedish minister for foreign affairs from 1978 to 1979, director general of the International Atomic Energy Agency from 1981 to 1997, and the head of the United Nations Monitoring, Verification and Inspection Commission from 2000 to 2003.

<sup>[6]</sup> Sigvard Eklund (1911-2000) was the director general of the International Atomic Energy Agency from 1961 to 1981.

<sup>[7]</sup> Heavy water is water that has been enriched with deuterium, making it denser than its non-enriched counterpart. It is used as a moderating material in certain kinds of nuclear reactors which can be used to create weapon-grade plutonium.

<sup>[8]</sup> Ernst David Bergmann (1903-1975) was an organic chemist and protégé of Chaim Weizmann who served as a member and later head of the scientific department of the Haganah. Bergmann was also the first chair of the Israeli Atomic Energy Commission (IAEC) from 1952 to 1966. He is widely considered to be the source of scientific inspiration for Israel's nuclear program.

<sup>[9]</sup> Bertrand Goldschmidt (1912-2002) was one of France's leading nuclear scientists and was the only Frenchman to work on the Manhattan Project. In collaboration with Glenn Seaborg, he developed the basic solvent plutonium extraction process which has remained one of the most widely used methods for reprocessing spent nuclear fuel. After the war, Goldschmidt began a long career at the Commissariat à l'Energie Atomique (CEA). At the CEA Goldschmidt was the head of the Chemistry Division from 1946 to 1959 then head of External Relations and planning. While at the CEA Goldschmidt was involved with the development of early French-Israeli nuclear ties, including fostering commercial exchanges of nuclear technology and nuclear policy development.

<sup>[10]</sup> Francis Perrin (1901-1992) was a French physicist who, with other French researchers, established the possibility of nuclear chain reactions and energy production.

<sup>[11]</sup> Jules Guéron (1907-1990) was a French nuclear scientist who was a member of the British-Canadian Nuclear Atomic Project during World War II. He became a member of the Commissariat à l'Energie Atomique in 1946 and served in a number of important roles until he left in 1958. Guéron was subsequently director general of research for the European Atomic Energy Community from 1958 to 1968.

<sup>[12]</sup> David Peleg served as Israel's science attaché in Paris in the early 1960s after Shalheveth Freier left. He served in various roles in the Israeli Atomic Energy Commission, including deputy director general and acting director general in the 1980s.

<sup>[13]</sup> Tanchum Grissim served as a science attaché in Paris in the 1960s. He ultimately rose to be the deputy director general at the Israeli Atomic Energy Commission.

<sup>[14]</sup> Shimon Peres (1923- ) was Israel's the deputy director general and director general of the Ministry of Defense in 1952 and from 1953 to 1959, respectively. In 1959, Peres became a member of the Knesset and was subsequently appointed deputy minister of defense, which he served as until 1965. Peres played an instrumental role in the development of Israel's nuclear program, helping to establish the Dimona reactor and securing French aid in the 1950s.

<sup>[15]</sup> Israel Dostrovsky (1918-2010) was a notable Israeli scientist. Working at the Weizmann Institute, Dostrovsky founded the department of isotope research and later served as the director general of the Israeli Atomic Energy Commission under Israeli Prime Ministers Levi Eshkol and Golda Meir.

<sup>[16]</sup> Guy Mollet (1905-1975) was the prime minister of France from 1956-1957.

<sup>[17]</sup> Électricité de France S.A. is a major utility company in France providing electricity using a variety of generation sources, including nuclear power.

<sup>[18]</sup> The Suez campaign (October 19, 1956-November 9, 1956), also known as the Suez crisis, was a coordinated military campaign against Egypt by France, Great Britain, and Israel in response to the nationalization of the Suez Canal by Egyptian President Gamal Nasser. The crisis was ended by joint pressure from the Soviet Union and the United States.

<sup>[19]</sup> Operation Musketeer was the Anglo-French-Israeli plan for the invasion of Egypt during the Suez campaign.

<sup>[20]</sup> The meeting at Sèvres produced what is known as the secret *Protocole de Sèvres*, a secret agreement that was signed between the governments of Israel, France and the United Kingdom during 3 day discussions held between 22 and 24 October 1956 at Sèvres, France. The protocol concerns their joint political and military collusion to topple Egypt President Gamal Abdul Nasser by invading and occupying the Suez canal in response to President Nasser's nationalization of the Suez Canal on 26 July. During that meeting, the French government formally agreed to supply Israel with nuclear assistance.

<sup>[21]</sup> Pierre Guillaumat (1909-1991) was French President Charles de Gaulle's minister of the army from 1958-1960 and minister of education from 1960 to 1961.

<sup>[22]</sup> The Commissariat à l'énergie atomique (CEA) was created in 1945 under Charles de Gaulle to oversee France's civilian and military nuclear activities.

<sup>[23]</sup> Pierre Péan (1936–) is a noted French investigative journalist. He covered the French-Israel nuclear collaboration in his book, *Les Deux Bombes*.

<sup>[24]</sup> Francois Mitterrand (1916-1996) was the president of France from 1981 to 1996.

<sup>[25]</sup> Robert Galley (1921-2012) was a French politician and head of the department of construction at the CEA, where he oversaw the building of the Marcoule plutonium extraction facility.

<sup>[26]</sup> Saint-Gobain is a French company, founded in 1665, that specializes in the production of construction and high-performance materials.

<sup>[27]</sup> Shalheveth Freier (1920-1995) was one of Israel's science attaché's to France from 1956 to 1960 and director general of the Israel Atomic Energy Commission from 1971 to 1976.

<sup>[28]</sup> Charles de Gaulle (1890-1970) was the leader of the Free French Forces during World War II, prime minister of France from 1958 to 1959 and president of France from 1959 to 1969.

<sup>[29]</sup> Albert Buchalet was a French general and head of the nuclear weapons department at the Commissariat à l'Energie Atomique in 1955.

<sup>[30]</sup> Reggane is a town in central Algeria and the site of Gerboise Bleue, the first French nuclear test. Gerboise Bleue actually took place on February 13, 1960.

<sup>[31]</sup> Pierre Mendès France (1907-1982) was the prime minister of France from 1954 to 1955.

<sup>[32]</sup> Joseph Laniel (1889-1975) was the prime minister of France from 1953 to 1954.

<sup>[33]</sup> Félix Gaillard d'Aimé (1919-1970) was the prime minister of France from 1957 to 1958.

<sup>[34]</sup> McGeorge Bundy (1919-1996) was Presidents Kennedy and Johnson's national security advisor from 1961 to 1966.

<sup>[35]</sup> During the Suez Crisis the Soviet premier, Nikolai Bulganin, sent letters to the governments of the United Kingdom, France and Israel in which he threatened rocket attacks on London, Paris and Tel Aviv if they did not withdraw their forces from the Suez Canal. It is considered a bluff. Nikita Khrushchev, in his memoirs, admitted the threat was designed simply to divide western opinion, especially since at the time the Soviet Union did not have enough ICBMs to launch the rockets, and in any case it had no intention of going to war in 1956. That threat however had major impact on Guy Mollet's attitude towards nuclear weapons.

<sup>[36]</sup> The EL-3 is a small research reactor in Saclay, France.

<sup>[37]</sup> Maurice Bourgès-Maunoury (1914-1993) was prime minister of France in 1957,

<sup>[38]</sup> The French Fourth Republic was officially dissolved on 4 October 1958 under the weight of the Algiers Crisis and was succeeded by the Fifth Republic later that year.

<sup>[39]</sup> Located in southeastern France, Pierrelatte is the site of the Tricastin Nuclear Power Plant. Its facilities include four pressurized water reactors and a uranium enrichment plant.

<sup>[40]</sup> Franz Josef Strauss [1915 – 1988), a German politician, was the chairman of the Christian Social Union, a member of the federal cabinet in different positions and long-time minister-president of the state of Bavaria. He was Federal Minister of Nuclear Energy Minister of Defence under Chancellor Konrad Adenauer. In these roles he formed close relations with Shimon Peres. .

<sup>[41]</sup> The Smyth Report, sometimes referred to by its official name: *A General Account of the Development of Using*

*Atomic Energy for Military Purposes*, was a report published by physicist Henry D. Smyth shortly after the bombings of Hiroshima and Nagasaki.

[42] A charges creuses is known as a shaped charge in English. It uses the Monroe effect to focus the energy of an explosion. Shaped charges are used in high-explosive anti-tank (HEAT) warheads.

[43] In 1989, Princeton Professor Richard Ullman published an article in *Foreign Affairs* entitled "The Covert French Connection" detailing American aid to French nuclear programs during the Nixon years. William Burr has expanded on Professor Ullman's work, using documents not available in 1989. Burr's work can be accessed at The Woodrow Wilson Center's Nuclear Proliferation International History Project's website via the following link; <http://www.wilsoncenter.org/publication/us-secret-assistance-to-the-french-nuclear-program-1969-1975-fourth-country-to-strategic>.

[44] A Permissive Action Link (PAL) is a security device built into a nuclear weapon designed to prevent unauthorized detonation.

[45] Maurice Couve de Murville [1907 – 1999] was a French diplomat and politician who was Minister of Foreign Affairs from 1958 to 1968 and Prime Minister from 1968 to 1969.

[46] The G1, G2, and G3 are graphite reactors. The G1 produces 46MW of thermal power per unit, while the G2 and G3 produce 250MW.

[47] Louis Andre Yves Giraud (1925-1997) was a French civil servant who was head of the CEA from 1970 to 1978.

[48] Valéry Marie René Georges Giscard d'Estaing (1926- ) was the president of France from 1974 to 1981.

[49] A pool type reactor is one in which the reactor's core is submerged under water in a large, unsealed tank.

[50] In 1955, Canada supplied India with a 40MW research reactor that used heavy water moderator supplied by the U.S. The CIRUS (Canadian-Indian Reactor, U.S.) first went critical in 1960 and was later used to produce plutonium for Indian's 1974 nuclear test.

[51] The Six-Day War, also known as the Third Arab-Israeli War or the June War, was fought between Israel and a coalition of Arab powers including Egypt, Syria, and Jordan. Israel won a decisive victory over the Arab coalition gaining control of the Sinai Peninsula, the Gaza Strip, the Golan Heights, West Bank and East Jerusalem.

[52] Jules Horowitz (1921-1995) was a member of the Commissariat à l'Energie Atomique and a notable French physicist.

[53] Jacques Soustelle (1912-1990) was a noted figure in the French Free Forces during World War II. From 1955 to 1956 he was the Governor General of Algeria, the minister of information in 1958 and the minister of nuclear energy from 1959 to 1960.

[54] The Quai d'Orsay is a street that runs along the southern bank of the Seine in the VIIe arrondissement of Paris.

[55] Péan, Pierre. *Les Deux Bombes*. Paris: Fayard 1981

[56] Emmanuelle "Manes" Pratt (1911- ) was an engineer and colonel in the Israeli Defense Forces (IDF) from 1957 until 1966. Many consider Colonel Manes Pratt as Israel's General Leslie Groves. He was also in charge of the construction of the Dimona reactor.

[57] La Société alsacienne de constructions mécaniques is a mechanical engineering company that produced the first atomic pile for Marcoule.

[58] The Service de Documentation Extérieure et de Contre-Espionnage (SDECE) was France's external intelligence agency from 1944 to 1982.

[59] The Direction de la Surveillance du Territoire was a French domestic intelligence agency that operated between

1944 and 2008.

[\[60\]](#) Mossad is Israel's foreign intelligence agency.

[\[61\]](#) The Atomic Energy Act of 1946, also known as the McMahon Act, established the US Atomic Energy Commission, directed control of nuclear weapons and energy development to civilian authorities, and created guidelines for the sharing of nuclear technology jointly developed with Great Britain and Canada.