

## NRAO ONLINE 18

### Australian Group Radiation Laboratory (AGRL)- July 1944 to April 1945

#### Epigraph

Guerlac (*Radar in World War II*, Tomash Publishers, 1987, p 1106) pointed out that both Compton and Bowen felt that it would be profitable for the Radiation Laboratory to send men to RPL in late 1943 early 1944. Although the OSRD Radiation Laboratory would not learn anything new in radar techniques, they could become familiar with the needs of the US forces in the SWPA. Guerlac reported on the self-assured American opinion in 1944: "RPL's research staff was limited in number and there were no more [additional] first-rate men to call upon in Australia. Moreover, microwave techniques were copied from the British and the Americans and were thus far behind, so that RPL needed skilled personnel. "

During White's visit to Washington in 1943, he discussed the idea of OSRD (Office of Scientific Research and Development) future assistance with Compton. Out of these deliberations, the AGRL initiative arose. By the time of White's arrival back in Australia in December 1943, he wrote a long letter to Rivett (5 January 1944) about a number of issues concerning collaboration with the UK and the US.<sup>1</sup> "I believe all members of the RAB are aware of the forthcoming visit of Dr K.T. Compton to Australia."

The circumstances of this important visit were described by Roy MacLeod (MacLeod, R. (1999). "The 'boffins' at Botany Bay: radar at the university of Sydney 1939-1945." *Historical Records of Australian Science* 12, no. 4: 411):

In December 1943, Vannevar Bush, formerly Director of the National Defence Research Committee and (since May 1941) Director of the Office of Scientific Research and Development, sent Karl Compton, President of MIT, on a "missionary expedition" to survey the prospects of scientific warfare in the Pacific. In January 1944, Compton conferred in Honolulu with American naval and army commanders, then spent twenty-six days in Australia, meeting General MacArthur in Brisbane, and several Australian scientists, including White at the Radiophysics Laboratory, as well as Sir George Julius, Chairman of CSIR, at CSIR headquarters in Melbourne [meeting of 12 January 1944,

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<sup>1</sup> In the Chapter 9 and ESM \_9.5, White's interactions with the UK authorities concerning joint assistance are described.

including also Rivett, Richardson and the recently arrived Bowen<sup>2</sup>]. Compton's visit underlined to Bush what OSRD already knew. To date, few American physicists had seen the Pacific. Some new weapons thought suitable for island and jungle fighting were oversold by visiting American experts, who, it was said, "travelled at too high a level" and "passed through the theatre too rapidly". The effect had produced a certain cynicism, not least among Australians who, as Compton noted, "were closer to those problems. They were doing splendid work on aspects of jungle fighting that were almost beyond the ken of American researchers. We had much to gain from collaboration with them."

... On returning to Washington, Compton reported on a range of technical problems peculiar to the Pacific, and recommended that direct liaison should be established between OSRD and Australian science. Bush approved Compton's proposal, and in February 1944, OSRD created two Pacific branches of its Office of Field Service – one for the Central Pacific Area, in Oahu, and one for the SW Pacific Area, at MacArthur's headquarters in Australia. [Brisbane]

A series of meetings followed in January, February, March and July 1944 in Melbourne, Sydney and Brisbane. The meeting of 12 January 1944 at the CSIR in Melbourne was an introduction to the visiting VIP Compton, presenting the big picture of the SWPA situation in early 1944<sup>3</sup>:

[Compton's pointed out that his] mission to Australia was to cover the whole range of work of OSRD to get a general picture of the position in Australia, and to find out where they could be of help, particularly in tackling realistic problems. [In contrast to Europe] ... very little had been done [by the OSRD] in ... respect to the Pacific area ... [I]t was high time that the [US] got a correct perspective of the position.

[Rivett replied to Compton] that it was a matter of importance to arrange that information got back to the USA as to what is required in the SWPA. He referred to the views expressed by Sir Henry Tizard regarding the neglect of RCM [Radio Counter Measures].

[Compton] said that OSRD would certainly want to send men to work in Australia. It would have to be a particular job and some of the men should work at the RPL where they would be in close collaboration with CSIR activities.

The second conference was held in Brisbane, the site of General McArthur's headquarters, GHQ, 21 February 1944. White met Major- General Spencer Akin, McArthur's Chief Signals

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<sup>2</sup> Bowen had just arrived in Sydney from the Radiation Laboratory at MIT (Boston). He knew the Rad Lab colleagues well since he had been their colleague since 1940 when he arrived for the first time in the US.

<sup>3</sup>Evans, W. F. (1970). "History of the radiophysics advisory board 1939-1945." Melbourne (Australia): CSIRO, 233 p., Annexure 52.

Officer GHQ. The purpose was to ratify the arrangements for the visit of scientists from the Rad Lab that were to come to RP in mid-1944.

At this time the suggestion was made that 19 scientists would be sent; in the end seven, including the leader, Dr Sam Seely, would arrive after July 1944.<sup>4</sup>

The next meeting was held on 18 January 1944 in Sydney at the RPL with Compton, Madsen, White, Rivett, Briton and Bowen plus two military officers.<sup>5</sup> The details of the OSRD proposal were discussed:

Dr Bowen suggested, and in this Dr Compton concurred, that the best way to bring this [transfer of information from the US to Australia at S and X band was essential since the Sydney group had limited experience] would be to send from the Rad Lab examples of the measuring equipment involved and if possible, to send with such equipment one or two skilled men who could interpret the technical aspects of the equipment to the scientific officers of RPL. These men would be required to come to Australia for a limited period only and could be expected to return to the US with information concerning such matters as the design of equipment for tropical conditions.

Bowen explained that considerable success had been achieved in RPL and SWPA in the design of air warning, height finding and GCI equipment. "It would, therefore, be an advantage to those concerned with this aspect of radar in the US to have full information about Australian developments." Compton said that two men would be sent.

The conclusions of the meeting were summarised:

With the assistance of the US scientific personnel, it is believed that it now becomes desirable to consider this work not only from the point of view of production in Australia, but also a guide to the correct design of equipment for production in the USA. For example, it may be possible to devise in Australia equipment particularly suited to the theatre and to have a small quantity of such equipment produced in Australia, while at the same time making available to the US all necessary details of the operational requirement and of the design of the equipment, so that the programme of production in that country can be more easily adapted to meet these requirements.

The ambitious L band system LW/AWH Mk II (see Chapter 9 and ESM\_9.6) would take 18 to 24 months for final deployment. Perhaps the project could be accelerated by bringing to Australia

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<sup>4</sup> White followed up with a status report to Rivett on 3 April 1944 (Evans, 1970, Document 54); a small number of Rad Lab personnel (to work on general radar development at RPL) would arrive in six weeks. With the inevitable delays, the group finally arrived after mid-July 1944.

<sup>5</sup> Evans (1970, Annexure 51).

“apparatus and information on the fundamental radio frequency parts of equipment and this information [could be] used for limited local manufacture.”

The third meeting in the series occurred on 21 February 1944 in Brisbane. White met Major-General Spencer Akin<sup>6</sup>. The purpose was to ratify the arrangements for the visit of scientists from the Rad Lab that were to come to RP in mid-1944. At this time the suggestion was made that 19 scientists would be sent; in the end seven, including the leader, Dr. Sam Seely, would arrive after July 1944.

Then a fourth and final meeting in the 1944 series of conferences occurred in March as George Harrison (head of Optics Division of the Radiation Laboratory and Dean of Science at MIT) had been sent by Compton to Australia. He was to act as Compton’s deputy and organise the Office of Field Service Mission in Australia. Harrison stayed until July, overlapping slightly with Seely. The AGRL (Australian Group Radiation Laboratory) was organised in May 1944 with Group Leader Samuel Seely reporting directly to Lee DuBridge in Boston (Director of the Rad Lab). There were already signs of multiple lines of authority with the potential for conflicts (see below).<sup>7</sup>

On 23 May 1944, Compton wrote to White, seven radar personnel were to leave by mid-June from Boston, most young men under the age of 30. Their goal was to (1) cooperate with RPL in the development of special equipment needed by US and Australian forces, unavailable from US and (2) assist in the use, modifications and operational use of new US radar. On 15 July 1944, Dr Samuel Seely, the head of the AGRL arrived in Sydney. Apparently, the inherent nature of the project with multiple lines of authorities caused immediate problems in 1944 and 1945. There was a missing consensus between RPL and AGRL, as RPL thought that AGRL was to be incorporated into their management and the AGRL thought “they were there to help RPL but keep their own identify”. GHQ had the impression that ARGL was under their control. A lack of success was to be expected given these disparate points of view.<sup>8</sup>

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<sup>6</sup> McArthur was enthusiastic about the collaboration; he had met Compton previously in Brisbane a month earlier.

<sup>7</sup> White followed up with a status report to Rivett on 3 April 1944 (Evans, 1970, Document 54); a small number of Rad Lab personnel (to work on general radar development at RPL) would arrive in six weeks.

<sup>8</sup> On 1 August 1944, White and Seely travelled to Brisbane for discussions at GHQ; they met Vice-Air Marshall Bostock (RAAF) for discussions on the air warning programme and then met General Akin of McArthur’s staff for a discussion of the general plan for the AGRL. (NAA C3823 E16/2/1B) On 11 Sept 1944, White wrote to Compton. At this time the proposed AGRL programme was: (1) Height finder 10 cm GCI (with no lobe structure from 0 to 35,000 feet), (2) local version of Little Abner, the Daisy Mae, (3) a naval set and (4) AGRL and RPL were to assist the RAAF in the introduction of airborne radar. Bowen and Seely were to travel to the North to check out possibilities.

By March 1945, the AGRL had finished their effective work; by April 1945 they departed Australia.

Six varying opinions about the role of AGRL and its impact have been located, dating from 1944 to 1998.

Immediately in late 1944, DuBridge was aware of the confused communications; he wrote Seely on 27 October 1944. The Rad Lab never assumed that ARGL could commit to a crash program, as his conclusion indicated anticipated trouble.

DuBridge (No 1 1944):

It was our understanding that [the AGRL] group was to go out to assist the Australians in the development of equipment urgently needed in the theatre. It was anticipated that some of the development of the RLP might go into small production in Australia, using Australian facilities and parts and components available there. The Rad Lab simply cannot undertake any crash programs on equipment not designed here. Any other crash programs which are deemed necessary there must be those which can be handled by Australian facilities and equipment. If there is urgent need for particular kinds of equipment, please let us know and we will inform you of the production equipment which most nearly meets these needs. We will help in whatever way possible to get production equipment allocated to [Australia]<sup>9</sup>.

In 1945 Seeley wrote a report (in Guerlac, 1987, p. 1110) with a strident tone: Seely reported in March 1945 ("The History and Activities of the Australian Group" 29 March 1945) expressing bilateral blame. He suggested that the Radiation Laboratory itself had shown a lack of cooperation [Guerlac, 1987, p. 1109-1110]:

Seeley (No 2 1945)

... [T]he American Forces will obtain no material benefit whatsoever. The only definite aid to American forces by AGRL personnel in the theatre has been in making GHQ [in Brisbane], RAAF and the several Air Forces somewhat radar conscious.

At the RPL [in Sydney] the general impression was, according to Seely:

A deplorable condition has existed throughout AGRL's existence. There has been not only the lack of cooperation by the [Rad Lab in Boston], but the attitude has been so

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<sup>9</sup> Guerlac (1987, p. 1111)

hostile that it appeared that obstacles were deliberately introduced [by the Rad Lab] to disrupt the carrying out of our work ... The aid furnished on GCHF [height finder of the “beavertail” type] [by the Rad Lab] was ... a distinct hindrance rather than a help ... [Then on the other hand] the general support of the Radiophysics Laboratory was quite inadequate, almost all AGRL work that did not contribute directly to the L band program [of RPL] being given low priority in the workshop ... The problem of procurement of special parts required in AGRL work and required in future RAAF work was given no support by RPL-- the location of manufacturers, all contacts with them during the course of the development, and the securing of raw stock through the [Australian] Ministry of Munitions, was left to AGRL and US Army personnel ...

**On the whole, it has been a most unsatisfactory experience for the AGRL personnel** [our emphasis] ... because ... information and techniques as were transferred to RPL were accomplished against severe opposition, and certainly with a minimum of support and appreciation. Whether the RPL attitude results from AGRL’s refusal on a number of occasions to act as a procuring agency for them of supplies from US sources (and it became evident very early in our history that this was looked upon as one of the main functions contemplated for AGRL) or that the view that the General Headquarters Program was unimportant or perhaps that the main responsibility of RPL was the RAAF. Suffice it to say that the attitude exists and no effort has ever been made to explain it or alter it.

Remarkably, Seely had a change of heart when he gave an interview to the Institute of Electrical and Electronics Engineers History Center in 1991, by William Aspry ([http://ethw.org/Oral-History:Samuel Seely](http://ethw.org/Oral-History:Samuel_Seely)). Seely explained that the group took some 3 cm equipment with them to Sydney and that “the purpose of our visit was not totally clear”. They worked with the NSWGR on the aerial construction of the Daisy Mae; Seely pointed out to the interviewer that the Australians were impressed with the name “Dizy” [the Australian pronunciation] May.

Seely (No 3 1991):

Some of 10 cm components we had sent to Australia served well as examples of the character of microwave plumbing at their 25-cm range ... On the whole, I think we did a credible job in our joint endeavours ... [RPL] had done quality work in radiowave propagation. I remember one fellow, Joe Pawsey, who was a pretty astute individual,

also a competent fellow by the name of Mills [Bernard]. Those with whom we worked were good people.

Seeley had himself been praised by White in 1944. In a letter of 1 August 1944 to Rivett, White wrote: "Seely is a very likable chap and I think will fit into the Laboratory organisation very well indeed."

Guerlac himself was equally critical in his summary of AGRL in 1987 (p 1105, 1107,1110):

Guerlac (No 4 1987):

In the European Theatre there was ... one command; in the Pacific there were several. Distances were great, communications difficult and fighting fronts far behind [in March 1945 the distance from General Headquarters near Japan to Sydney was 4500 miles with effective liaison impossible]. Moreover, there was, until V-E Day, the question of priority, and with it the inertia which came from knowing Pacific Theatres would get the newest equipment and enough of it only after the demands of the European Theatre had been met.

The policy was to send some American supplies and equipment with the men [from the US] (this was Bowen's advice) but to follow the standard US policy in Australia of purchasing everything the country could afford to supply there.<sup>10</sup> Thus, the items that the US would be expected to supply would be of a special nature ...

The failure of AGRL may be attributed to several causes ... [I]deas as to the purpose of AGRL were quite conflicting. The Radiation Laboratory's ideas didn't jibe with theatre policy, and none of them jibed with RPL policy. It was RPL's idea that AGRL was to be incorporated, [Rad Lab's idea] that members of AGRL were to help but keep their own identity and be useful to [Rad Lab]; while [Allied Headquarters in Brisbane] understood that AGRL was to work with them directly. Actually, it was never clarified until AGRL arrived ... Then it became very clear and definite. AGRL was to be responsible to the theatre [Brisbane] since it was theatre which issued the request and gave the priority ...

With this level of confusion, partial failure was inevitable.

In 1998 at the Boffins conference, Minnett et al (*Boffins*, p 464) reported in a reserved manner his opinion of the AGRL experience of 1944-1945:

Minnett et al (No 5 1999)

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<sup>10</sup> Thus the US and the Australian had different conceptions as to who would supply critical components. The Australians wanted more US equipment and the US wanted to insure procurement in Australia.

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[The AGRL group attempted to build a prototype] 10 cm GCI system ... None of these efforts were entirely successful. However, RPL's move to microwavelengths for RAAF air warning radars was noteworthy ...

Guerlac (1987, Appendix D "The Organization of Civilian Scientists in the Pacific", p 1105) wrote a negative assessment of the AGRL experience. The root cause was organisational confusion from the beginning. The lines of communications were unclear.

In summary, Guerlac wrote (p. 1111):

Guerlac (No 6 1987)

As far as Rad Lab was concerned, Seely's group had been sent to RPL to augment RPL's personnel and to introduce American microwave techniques. It was assumed that procurement for production of equipment would be accomplished by the Australians. If it had been contemplated that AGRL would initiate and call on the Rad Lab for the support of crash programs [rapid and intense production], AGRL would have been staffed quite differently.