

AGENDA

NRAO Staff Meeting
Green Bank, West Virginia

June 14, 1958

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NATIONAL RADIO ASTRONOMY OBSERVATORY

STAFF MEETING

Green Bank, West Virginia

June 14, 1958

→ Dr. Heeschen
file off

Copy of agenda attached.
Record prepared by C. F.
Dunbar, July 8, 1958

Present: Lloyd B. Berkner
Lewis R. Burchill
Franklin J. Callender
John J. Carroll
Frank D. Drake
Charles F. Dunbar
Richard M. Emberson
David S. Heeschen

Note: Dr. Leo Goldberg, a member of the Board of Trustees of Associated Universities, Inc., also attended the meeting.

1. Personnel

1.1 Plans of Professional Staff: Emberson pointed out that because of delay in completion of the 85' Telescope, it will be possible for Heeschen to go to both Paris and Moscow this summer. Drake is to give a paper at the Paris meeting. Goldberg, Emberson and Heeschen all favor Drake's going to Moscow as well as to Paris and consider the comparatively slight additional expense fully warranted.

Berkner approved plans for Heeschen and Drake to go to both Paris and Moscow.

Findlay said he would like to go to Europe late in October and inspect electronic installations and equipment at various radio astronomy installations. He is particularly interested in the work on receivers which is going forward in Holland, and also wishes to go to Norway. He thinks the trip will last about four weeks. Berkner approved.

1.2 Limited or Other Appointments

1.2.1 Grote Reber: Emberson reported that Mr. Reber is coming to Green Bank somewhat later in July than was originally planned. Callender reported arrangements with Mr. Schauer for AUI to act as purchasing agent for Reber while he is at Green Bank and to submit receiving reports and invoices to Research Corporation for reimbursement.

The pieces of Reber's original telescope are now at Green Bank, and Callender and Findlay hope to set up the instrument as part of the Museum. It will probably be located on the Brown property. Installation can probably be completed late in the summer, after Reber arrives to assist with the work. Emberson proposed that Research Corporation

be asked to bear the cost of materials required for setting up the telescope, in return for the Observatory's supplying the labor.

Berkner approved Emberson's plan for discussing the whole matter with Research Corporation. Burchill pointed out that the latter will unquestionably want to establish some kind of cost ceiling on expenditures for the benefit of Reber during his stay at the Observatory and also for setting up the telescope.

1.2.2 Jack Campbell: Findlay said Campbell still had not made up his mind about the appointment. Findlay is willing to postpone the final decision for a while.

1.2.3 Hvatum: Dr. Hvatum should be able to serve as a substitute, if Campbell decides not to come. The \$8000 salary authorized at the staff meeting on May 1, 1958 is acceptable.

1.2.4 C. M. Wade: Dr. Campbell M. Wade is working at the Royal Observatory in Australia on a two-year appointment. He has indicated that he would like to work at NRAO when he gets back to the United States early in 1960. Heeschen read a letter of recommendation from Dr. Bok. Heeschen suggested the undesirability of having the first three scientific staff appointments all men from Harvard.

Berkner decided that no definite action should be taken at this time. In the meantime, he proposed asking Wade to keep AUI advised of his plans. Wade should be put on a list of candidates for a research associate type of appointment. Berkner will write to Dr. Bok.

In this connection, Heeschen said he hoped to be in a position to offer one-year appointments as Research Associates to several foreign scientists.

1.2.5 V. Radhakrishnan: Berkner said that V. Radhakrishnan had been recommended to him by George Sponsler (ONR Liaison, London) for appointment to the Observatory staff. Heeschen doubts the advisability of giving him an appointment at the salary level requested. Berkner will write to Sponsler about this proposal.

Berkner urged that great care be made in selection of Research Associates. He pointed out the undesirability of filling the staff, except at the senior level, before the appointment of a Director.

1.2.6 Summer Appointments: Findlay described the summer appointments he has made, largely for the purpose of helping him with his testing horn. He introduced Frederick Bartlett, who has just graduated from Yale and expects to do graduate work there in astronomy. Bartlett is already at work, under an appointment approved on May 1, 1958.

Berkner asked what budgetary provision had been made for summer appointments in 1959. Callender said the budget for FY 1960 contains some provision for appointments of this kind. Heeschen said he would like to be able to invite some senior astronomers to the Observatory in FY 1959 to work on the 85' Telescope. Unquestionably, some of these

visitors will not require salary. Of the budgetary allocation of \$15,000 for appointments in FY 1959, a substantial part will have to be reserved for Mr. Reber, because NRAO has agreed to pay one-half his salary for the year.

Callender urged that on temporary appointments every effort be made to avoid providing full support. He would like to see the temporary payroll kept to a minimum. Berkner fully approved and urged the use of Research Collaborator and Guest appointments, so far as possible.

1.2.7 Mechanical Engineer: Emberson and Dunbar reported that they were making efforts to find candidates.

1.2.8 Staff Meeting: Berkner said Dr. Bok wishes to visit Green Bank on July 10 and 11, which would be about the right time for a staff meeting, but it would conflict with the July meeting of the Executive Committee. It was decided that if Dr. Bok's plan remains firm, Heeschen and Drake will remain at Green Bank. If there has been satisfactory progress on the supplemental appropriation, Berkner will meet with Burchill, Callender, Dunbar and Emberson at Brookhaven on the morning of July 10. If events appear to make it necessary, there can be a full staff meeting in New York on July 9. (Berkner subsequently decided Callender need not attend the Executive Committee meeting and so he will remain at Green Bank.)

1.3 Advisory Committee

1.3.1 Rotation of Membership: It was agreed that Berkner, Emberson, Heeschen and Drake would discuss the selection of candidates for appointment to the Advisory Committee in October 1958.

1.3.2 Meeting, Wednesday, October 15: Emberson has discussed with Dr. Menzel the plan for an Advisory Committee meeting at Green Bank or Warm Springs on October 15 (Wednesday). Berkner would like to devote October 16 to inspection of the site and dedication of the 85' Telescope. Berkner considers that Dr. Tuve and Mrs. Taitel should be invited to be present on that day, but it was the consensus that the general public should not be invited. Emberson will try to get a suitable plaque to be placed on the instrument, recognizing Taitel's work on the design. Callender will prepare a draft of a program for the day.

Berkner proposed that Dr. Menzel be asked to give an oral report from the Advisory Committee at the Trustees' meeting on October 17. If this arrangement is made, it probably will be necessary to have an Executive Committee meeting at 3:00 p. m. on the afternoon of October 16. (Note added in editing: It might be more convenient for Dr. Menzel if he could report to the Trustees on the afternoon of October 16, so that he could depart that evening.)

2. Finances and Budget

2.1 Submittals to NSF

2.1.1 Operating and Capital Budgets: Callender said an ample

supply of copies of the operating and capital budgets approved at the May Executive Committee meeting had been delivered to NSF. He produced a copy of a letter he wrote to Luton at NSF dated June 4, 1958 in regard to the decision of the Trustees to push for acquisition of additional land in Arbovale. The Corps of Engineers is aware of AUI's wishes in this matter and estimates the cost at \$40,000. In addition, Mr. Wolaver would like to sell for \$5,000 (the price he paid) the ten acres on the west side of Route 28, opposite the entrance road.

Various matters connected with site planning were discussed. Berkner would like to have a preliminary site plan prepared for consideration at the September Executive Committee meeting.

The electric power program was discussed. Callender said there was not much to be gained by further discussion with Monongahela Power Company until the Observatory can give a firm estimate of its needs. Findlay said he hoped to have a power budget, estimating connected loads, ready in July or August. He would like to persuade Monongahela to proceed with a new 66 KV line into the area and would like to have all lines within the Green Bank valley run underground. Berkner said that Monongahela's over-all power plan for the area should be considered before coming to any agreement. Burchill urged that no easements be granted, if it can be avoided.

Emberson described the meeting with Civil Aeronautics Authority representatives in regard to proposed enlargement of facilities at the White Sulphur Springs Airport. The Navy plainly wishes to discourage industrial development in the neighborhood of its Sugar Grove installation.

Housing: Berkner said the original plan had been to build 6 houses on the Observatory site for use by the staff. He asked whether this plan should be pushed, and whether acquisition of housing off site was at all feasible.

Burchill said the local banks will not lend more than 60 per cent of a very conservative valuation, which makes financing difficult. Callender strongly believes that the regular staff should be encouraged to live off site. In this way, the small amount of housing on site can be kept for visitors, temporary employees, and persons who need time to make permanent arrangements off site.

Berkner suggested that efforts be made to work out an arrangement with an insurance company on mortgage loans, so that positive assurance on the housing situation can be given to new employees in advance.

Berkner agreed that the tenure staff, with the exception of the Director, should live off site. In his opinion, a house should be built on the site for the Director, and he instructed Callender to select a suitable location and get some plans and cost estimates, with a view to including this item in the capital budget for FY 1961.

Fixed Antenna: Berkner pointed out that the budget figure of \$300,000 is in large measure a guess, and asked what progress had been made with the design. Findlay said substantially no progress had been

made, but hopes to work on the problem during the summer with the assistance of Drake. The cost of the structure (paraboloid or otherwise) can be worked out without too much difficulty. The major areas of uncertainty are the mast and the nature of the structure. Heeschen emphasized the importance of sky coverage.

2.1.2 Request for authorization to proceed on buildings: Emberson said, if authorized to do so, Bliss can do the foundation and some forward procurement for a price of about \$1,460,000. The buildings contemplated will cost about \$600,000. Berkner understood that the Bureau of the Budget is prepared to authorize NSF to go ahead, once Congress has acted.

2.2 Status of Supplemental Request: Berkner understands that the final supplemental request submitted by NSF to the Bureau of the Budget was for \$4,430,000, which is \$12,000 lower than was anticipated. The reason for the discrepancy will be discussed with NSF representatives on June 16. This reduction will require further tightening of an already tight budget.

3. 85' Telescope Program

Emberson expressed the view that Blaw-Knox is trying to economize on the 85' Telescope. There is a good chance that there will be delay even after early October.

3.1 Foundation: Heeschen said the foundation for the telescope had been poured and the three piers and the anchor bolts are accurate to the required 1/16 inch tolerance. The grouting of the anchor bolts has been postponed until the base plates are delivered to the site, because the templates promised by Blaw-Knox vary from the design drawing by more than the stipulated tolerances. A representative from The Embico Co. will come to Green Bank when the grouting is done.

3.2 Control Buildings - Final Cost Estimate: Callender said a small price adjustment will be necessary on the Control Building. The total cost has proved to be about \$34,000 as against a budgeted figure of \$33,000.

3.3 Blaw-Knox Performance: Emberson and Carroll expressed dissatisfaction with the progress by Blaw-Knox. It is apparent that the engineering and detailing of shop drawings is taking longer than Blaw-Knox estimated in May, and Blaw-Knox's efforts at economy may mean serious further delay. It seems unlikely that Blaw-Knox can start erection in the near future. Some parts have been completely fabricated, but there have been serious delays on others that will be needed early in the erection schedule. Blaw-Knox is buying the gears in flat sections instead of having the forming done by Illinois Gear Works, which is fabricating the gears. Illinois Gear Works have successfully formed a gear segment to the proper curvature by a rolling process.

Findlay emphasized the importance of getting a construction schedule from Blaw-Knox when Heeschen and Drake go there with Michigan representatives on June 17. Emberson said that if Heeschen is unsuccessful, he will arrange a meeting with Jackson, the Vice President in

charge. Berkner urged insistence on delivery of the base plates for the tower and commencing of erection.

Emberson said Blaw-Knox bought about 16,000 pounds of lead in the open market at a figure which appears to be above the current market price. He will check this purchase.

3.4 Inductosyn Precision Indicators

3.4.1 Blaw-Knox Change Order: Blaw-Knox has quoted a price of \$1,060 for special machining and fittings for installation of these indicators. Brown considers this figure reasonable, and Emberson has authorized a change order.

3.4.2 Controls Equipment Contract: A purchase order has been issued to Controls Equipment Corporation in the amount of \$64,000, including shipping, testing, and installation. Work is in progress. The purchase order contains a payment schedule based on estimated performance, to be checked by AUI.

3.5. AIL Receiver: Findlay expects to inspect and accept the AIL Receiver about June 26 or 27. Heeschen approves the quality of the work to date, and the delay of about a month is immaterial. Final payment will be due on delivery and acceptance.

3.6 TWT Receiver: Drake said fabrication of the TWT Receiver by Ewen-Knight Corporation is on schedule. A prototype is in operation and working satisfactorily. Additional data processing equipment, including a computer, will probably be necessary, but Drake does not yet know just what will be wanted.

3.7. Jasik Feed: Findlay thinks Jasik's feed will be ready before July 1. Emberson said Jasik's proposal to NSF on the low back lobe 21 centimeter feed had been accepted. NSF wants to settle details before June 30. He will discuss this matter with Luton on June 16.

4. 140' Telescope Program

4.1 Status of Contract: Emberson reported that the contract was in final form, and so far as he knew, ready for signature without modification, the next day, when representatives of E. W. Bliss Company are expected. He also reported that Mr. Richard Moss, who has been in charge of contract negotiations for Bliss, has accepted a position with Lukens Steel Company.

In connection with the 140' Telescope, Goldberg asked what was being done about an exhibit at Moscow. Emberson described discussions with NSF and U. S. Information Agency and inability to arrive at any plan for an exhibit. U.S.I.A. considered \$25,000 would be necessary for an adequate and proper exhibit and took the position that it had neither the funds to pay for the exhibit nor the time necessary for its preparation. Goldberg expressed regret. The possibility of sending the model of the 85' Telescope was discussed.

Berkner said consideration should be given to preparation of a more or less permanent exhibit for use on occasions of this sort.

4.2 Bliss Engineering: Emberson and Carroll estimated that Bliss has completed about 50 per cent of the detailed engineering.

4.3 Franklin Institute -- Polar Shaft Bearing: Franklin Institute is finishing up the design for the polar shaft bearings. It will be necessary to satisfy Ashton and Bliss on the design.

4.4 Drive and Control: Bliss has solicited bids on the drive and control system. Until bids are received, the price is completely uncertain. It is also uncertain whether a contract for the drive and control can be negotiated without any provision for escalation.

4.5 Foundation

4.5.1 Irving Bowman Specifications for Finishing: Bowman is re-estimating the cost of finishing the interior of the foundation. The most recent estimate is \$35,700 for finishing the control room, which contains about 2,000 square feet. The total cost of finishing the entire foundation will be about \$130,000.

4.5.2 Bliss Estimates: Darin & Armstrong will provide, via Bliss, an estimated cost for the foundation itself, as well as an estimate on finishing.

4.5.3 Other Bids: Bliss has agreed to invite Wicks & Company, an Iowa construction firm, to bid on the foundation, because of the exceptionally low proposal Wicks made in October 1957, the subsequent involved discussions, and the need to clarify the Wicks' bid. Bliss may also solicit a bid from at least one other contractor besides Darin & Armstrong.

The question who shall benefit from any saving on the foundation was discussed. It was concluded that under the terms of the contract with Bliss, any such saving would have to be regarded as being for the sole benefit of Bliss, since it is making a fixed-price proposal.

5. Electrical Power

5.1 On Site Distribution: Callender reported that the on-site distribution system is nearly completed and power from the Monongahela Power Company is available. Bailey & Ramey is to test the system and clean up the site of the work. Bailey & Ramey have cleaned and sealed the empty conduits.

5.2 Callender described some of the problems which will arise in on-site distribution in the future. At the moment it seems undesirable to install any more elaborate permanent system than now exists.

6. Works Area

6.1 Review of Plans: Plans for the Works Area have been reviewed and approved.

6.2 Schedule for Bidding and Work: Bowman has solicited bids for the Works Area, and the opening will be on July 14. The invitation

contains a number of alternates, including red brick or stone trim. The plans call for aluminum windows, a basic lighting system, and the carrying of all utility lines to five feet beyond the outside of the building or adjacent open areas. Callender hopes building will be completed by January 1, 1959, with occupancy possible by December 15, 1958. The first two phases of the work contain 11,000 square feet.

Berkner decided that the third phase should be canceled and the contractor instructed to proceed with both phase 1 and phase 2, if the bid is within 10 per cent of the cost estimate. He also directed that the building be moved 10 feet nearer the road to allow space for ultimate expansion. As to red brick versus stone, Berkner said that if the low bid was under \$130,000, stone should be used, provided the cost does not exceed that of the brick by more than a dollar per foot.

7. Laboratory

7.1 Status of Plans: Bowman is at work on the detailed plans for the Laboratory Building. Preliminary sketches were accepted.

8. Residence Hall and Cafeteria

8.1 Status of Plans: Preliminary sketches of the Residence Hall and Cafeteria were offered for inspection. Berkner urged that an effort be made to arrive at cost on a functional basis. Under the plan the kitchen and cafeteria will contain 2,000 square feet. There will be space for a lounge, with a temporary partition of some sort between it and the cafeteria.

Callender proposes to entertain bids for both the laboratory and the residence hall and cafeteria as a single contract, because Bowman believes the combination may result in a lower total cost than could be obtained through separate bids and contracts.

9. Other Activities

9.1 Ewen-Purcell Horn: Findlay reported this instrument is primarily for museum purposes but might be employed in some of the experimental work.

9.2 Large Standard Horn: Findlay reported progress in design and selection of location. He has encountered some problems in selection of right type of aluminum suitable for welding, and proposes to discuss this with Ashton in the near future. As presently designed, the horn is made up of aluminum sheets 12' x 4', with supports at the junctions.

9.3 12' Paraboloid: This instrument has reached Baltimore and will be delivered at Green Bank during the next few weeks.

9.4 Receiver and Other Electronic Work: Findlay will assemble a receiver for the 12' Paraboloid.

Drake is planning to build an interferometer composed of two corner reflectors operating at 15 to 50 mc. This will enable him to do solar

system work and to check the site at low frequencies. The project is complimentary to the work being done by Bartlett as part of the Yale program. Goldberg recommended that Roger Gallet be consulted.

Bartlett described the plan to set up an apparatus to take coincidence measurements at 23 mc.

9.5 Very Large Antenna: Emberson reported that very little had been accomplished on the Very Large Antenna. Findlay has discussed the problems with representatives of Sylvania Electric Corporation, who have offered to construct arrays, which would give resolution but not the necessary gain.

Emberson emphasized the necessity for building up manpower, if progress is to be made on the Very Large Antenna. Berkner suggested getting the work done outside, but diameter and surface tolerances must first be determined. He suggested employing Dr. Feld to undertake a study of the structural problems. In his judgment, NSF will consider requests for financial support of specific studies, as they are proved necessary. Emberson suggested the following subjects for studies:

- 1) Cost and structure for an antenna covering a large area
- 2) Investigation of multi-mirror systems
- 3) Study of special feeds suitable for an instrument of this sort.