

AGENDA

NRAO Staff Meeting

Green Bank

Thursday, May 1, 1958

1. Personnel
  - 1.1 DSH
  - 1.2 Future Travel - Moscow Exhibit
  - 1.3 Campbell/Alberts/---
  - 1.4 NAS-CD Study
  
2. Site - Master Plan
  - 2.1 Interim arrangements for land use
  - 2.2 Road
  - 2.3 Electrical Distribution
  - 2.4 Easements/Local Zoning
  - 2.5 FCC & CAA
  
3. 85-Foot Program
  - 3.1 Blaw-Knox
    - 3.1.1 Probable Schedule
    - 3.1.2 Lead Situation
    - 3.1.3 Tests and checks
  - 3.2 Ivy
    - 3.2.1 Control Building
      - 3.2.1.1 Cable trench between building and telescope
    - 3.2.2 Foundation
      - 3.2.2.1 Check on placement of piers and bolts
      - 3.2.2.2 Grout in two later steps
  - 3.3 Receivers
    - 3.3.1 AIL
    - 3.3.2 Ewen Knight
  - 3.4 Jasik Feed
  - 3.5 Precision Indicators
  
4. 140-Foot Program
  - 4.1 Contract Status
  - 4.2 Structural Detailing
  - 4.3 Polar Bearings
  - 4.4 Drive & Controls
  - 4.5 Materials - Steel
  - 4.6 Interior of Foundation
  
5. Budgets and Administration
  - 5.1 Submittals in 1955-56
  - 5.2 Status of Supplemental
    - 5.2.1 Bliss-Bow
    - 5.2.2 Other Support
  - 5.3 Operating budget for FY '59
  - 5.4 Provisional budget for FY '60

- 6. Other Programs
  - 6.1 VLA
  - 6.2 Calibration Horn
  - 6.3 Participation by Others
    - 6.3.1 West Virginia, etc.
    - 6.3.2 Reber
    - 6.3.3 Noise in blackouts
  
- 7. Building Program
  - 7.1 Renovation progress
  - 7.2 Design for works area
  - 7.3 Other

NATIONAL RADIO ASTRONOMY OBSERVATORY

Staff Meeting

Green Bank, West Virginia

May 1 and 2, 1958

*file*

*A. Heeschen*

Copy of agenda attached.

Present: Lloyd V. Berkner  
Lewis R. Burchill  
John J. Carroll ~~F. J. CALLENDER~~  
Frank D. Drake ~~(F. J. CALLENDER)~~  
Charles F. Dunbar  
Richard M. Emberson  
John W. Findlay  
David S. Heeschen

1. Personnel

1.1 Dr. Heeschen at Jodrell Bank: Heeschen gave a brief account of his work with the British 250' telescope at Jodrell Bank. In the evening he gave a more detailed account and described some of the difficulties which the British have encountered and the potentialities of the instrument.

1.2 Future Travel - Moscow Exhibit: Emberson said he had talked with Keller and Seeger at NSF about the desirability of having an exhibit at the meeting of the International Astronomical Unions which will be held in August in Moscow. They had talked with representatives of the U. S. Information Agency, which, like NSF, has no money in the present budget for this purpose. U.S.I.A. said that there was insufficient time to prepare an exhibit, but would like to look forward to FY 1960. Emberson's conclusion is that there is nothing more to be done concerning this summer's meeting.

Through Blaw-Knox Company a model of the 85' Telescope has been ordered at a cost of \$1200. It will take about a month to build and the scale will be 1/4 inch to one foot.

Berkner directed that the model of the 140' Telescope be sent to NSF for possible use in Congressional hearings. Emberson estimated that another model can be built for less than \$2500. This second model is needed for planning purposes, i.e. installation of cables, etc. In addition, it would be adequate for future exhibition purposes. It would not need to be so heavy as the one used in the wind tunnel tests.

Berkner considers that the Observatory should develop an exhibit which can be used on appropriate occasions, consisting of the following:

- 1) Models of the telescopes
- 2) Model of the site and the surrounding terrain, with particular emphasis on the noise reduction factors
- 3) A variety of pictures and records

1.3 Campbell/Alberts: Findlay said he had made a formal offer to Campbell in accordance with the action taken at the last staff meeting, but has not received an answer.

Emberson reported that Alberts is not interested in a permanent position, but would accept a two-year appointment covering the period of construction of the big telescope. Berkner directed that, if the interview with Alberts is satisfactory, an offer be made to him on this basis as soon as possible. It should be understood, however, that his duty station will be Green Bank.

1.3.1 Other Personnel: Findlay proposes to make an offer of employment as Grade B Technician to Homer Woods, who has been working during his military service as an electronics technician. Berkner approved this appointment.

Dr. Olaf Ridbeck, in Sweden, has proposed to Findlay that one of his associates, Dr. Hvatum, who has a Ph.D. in electronics, be given a one-year appointment at the Observatory. In Findlay's judgment this proposal should be accepted. The man's capabilities appear to be good, and it is desirable to develop a connection with Dr. Ridbeck and his Laboratory. He proposed that Hvatum be offered a one-year appointment commencing October 1, 1958 at a salary of \$8,000. Berkner approved this appointment.

Heeschen reported that a young man named Bartlett, who will receive a bachelor's degree in astronomy from Yale in June, has applied for a summer job. He is well recommended by Dr. Lilly and others. Heeschen proposed that he be offered a position for three months at a salary of \$400 a month. Bartlett expects to begin graduate work in astronomy in September. Berkner approved this appointment.

1.4 National Academy of Sciences - Civil Defense Study: Emberson reported that he had been asked by the National Academy to participate in a Civil Defense study requiring an estimated total of about three weeks commencing in the latter part of May and continuing into June. Berkner expressed the opinion that Emberson's presence on the project was absolutely essential and that he should not participate in the study.

## 2. Site Master Plan

2.1 Interim Arrangements for Land Use: Berkner said that an intermediate plan should be developed for use of the site. It will unquestionably be necessary, as the Observatory gets into operation, to make periodic arrangements for the temporary installation of observing equipment of one kind or another. Therefore, sites where equipment of this kind can be located should be selected tentatively, and plans made for the construction of temporary roads and power lines. It is not desirable to plan at this early stage the building of a general road system. It will be much better to proceed with a series of ad hoc arrangements and temporary construction until the uses to which the site will be put are better known. Temporary roads can be built where existing roads are not adequate and parkway cable can be laid underground at relatively little expense to bring electric power to a wide variety of locations. Any such ad hoc installations should, of course, be consistent with the master plan for the whole site.

Findlay said one immediate need was a map showing all existing roads and power lines. He recommended that no existing power lines be removed until it is clear that they are a source of interference. Findlay pointed out the feasibility of beginning to work out a road system based on existing roads.

Callender inquired whether it would be possible to employ delinquent boys at a nearby state camp for unskilled work on the site. The possibility of this being contrary to Article XX in the contract with the NSF was discussed, and Dunbar said he would try to get an answer.

Callender also said he was making arrangements for an aerial map of the site. In this connection, it will be necessary to find out who owns the existing roads and whether the acquisition of title by the Federal Government has extinguished the easements previously obtained by Monongahela Power Company for the installation of power lines.

Hoeschen pointed out the need for immediately planning an on-site telephone communications system. Berkner recommended that advice be obtained from Federal Radio and Telephone Company, Standard Telephone Company, or Stromberg-Carlson Company on the best PBX system to be installed. He estimated that the cost of such a system would be \$25,000 to \$30,000. Burchill pointed out that no specific provision had been made in the budget for this item, but its necessity was recognized.

Berkner directed that the surplus property lists be scanned for available telephone equipment and maintenance equipment of all sorts.

2.1.1 Wolaver and Rhinehart: Emberson said he and Callender had met in Washington with Messrs. Wolaver and Rhinehart, who are the owners of about ten acres of land immediately across Route 28 from the entrance to the Observatory. They had expressed an interest in building a motel and restaurant at this location. Emberson explained that the Observatory was opposed, of necessity, to commercial activity in its neighborhood, and also explained that the establishment would be a much smaller one than Wolaver and Rhinehart believed. He also suggested that in view of the change in circumstances they might prefer to sell to the Government the land they have acquired.

2.1.2 Corps of Engineers: Callender said he had conferred with the Corps of Engineers about the possibility of purchasing about 42 acres of land abutting on the east side of Route 28 and extending from Arbovale south to a point roughly opposite the AUI office. The Corps estimated that this land could be purchased for between \$100,000 and \$105,000. However, this estimated price can be reduced to about \$60,000, if two of the houses are omitted, and to about \$40,000, if all the houses are omitted. Berkner directed that Callender make the necessary arrangements with NSF, so that a request will go forward to the Corps to acquire all of the land in question, exclusive of the houses.

2.2 Road: Callender said he did not propose to do any more work on the road until the heavy construction program had been completed.

2.3 Electrical Distribution System: Callender reported that the work on the electrical distribution system is going forward. Findlay said the present power supply will prove inadequate, if the building program planned is carried out. This means the acquisition and operation of a generator (with proportionate increase in staff), unless Monongahela is proposing to enlarge the capacity of its lines leading to the Observatory. Berkner instructed Callender to find out what Monongahela is proposing to do, and also to get the cost estimates necessary for including in the FY 1960 budget a request for funds to obtain about 500 KVA.

Findlay said the present supply will produce 300 KVA, but this will be insufficient once the 140' Telescope is in operation. He will prepare a power budget to be available by the middle of July.

Berkner directed that preliminary steps looking to the acquisition of a stand-by generator for the 140' Telescope, with capacity of 300 KVA and automatic start-up and cut-off equipment be investigated.

Heeschen remarked that power failures in the area are frequent and that they are not accounted for satisfactorily.

2.4 Easements and Local Zoning: Emberson said he had instructed Porter to abandon any effort to obtain adoption of a zoning ordinance by local governmental zoning authorities. This decision met with approval.

Berkner said he proposed to request the sum of \$250,000 in the FY 1960 budget for site protection. In his judgment it is desirable to acquire enough additional land to block the expansion of Green Bank in every direction except to the south, and to prevent entirely any further expansion of Arbovale.

2.5 FCC and CAA: Findlay said that Porter believes the FCC will issue a ruling establishing a protective zone along the lines previously discussed in the not too distant future.

Findlay said that CAA is considering a plan for the expansion of the airport at White Sulphur Springs. This would involve installation of equipment which might be a serious source of interference. Porter has arranged a meeting with CAA to discuss the situation. It was the consensus that the proposed plan at White Sulphur Springs should be vigorously opposed. Findlay also understands that Piedmont Airlines is seeking to establish a service between Washington and Elkins. This would be decidedly advantageous to the Observatory. Elkins is nearer than White Sulphur Springs, and the intervening mountains provide adequate screening.

### 3. 85' Telescope Program

#### 3.1 Blaw-Knox

3.1.1 Probable Schedule: Carroll produced a schedule, including information supplied by Blaw-Knox, indicating that the foundation will be completed by May 15, 1958 and fabrication of the telescope by July 1. Completion and erection apparently will not be completed until September. Various discrepancies in the schedule were pointed out, and it was agreed that there should be a full discussion with Blaw-Knox on May 7. It was decided that Burchill should accompany Messrs. Emberson, Heeschen, and Carrol to Pittsburg and that any delay beyond the completion date specified in the contract (July 15, 1958) should be vigorously protested. Emberson expressed the belief that Blaw-Knox had received military orders for 85' antennas and might well be giving them priority over the instruments for Michigan and AUI.

Callender said he had received requests for extension of time from both Ivy Construction Company and Bayliss & Ramey. He said he saw no reason for agreeing, even though it is unlikely that Blaw-Knox will complete its work on schedule.

Findlay reported that Airborne Instruments Laboratory was about two weeks behind in building a receiver for the 85' Telescope. Ewen-Knight appears to be going forward about on schedule.

As to the work at Blaw-Knox, Emberson said he understood the reflector is in the shop and the pedestal should have gone to the shop May 1. Design of the polar shaft is not completed, although all shop drawings were supposed to be finished by April 30, 1958. Emberson said he wished to have Heeschen act as coordinator for the 85' Telescope and all activities relating to putting it in operation. He should be given copies of all correspondence, etc.

3.1.2 Lead Situation: Carroll said all but about 12,000 pounds of lead has been acquired. This balance will be bought on the open market. The necessity for segregating the lead for the AUI telescope was emphasized.

3.1.3 Tests and Checks: Emberson said he wished Blaw-Knox to furnish formal reports on all tests and checks. In these reports each panel and gear segment should be identified by number, so that test results could be referred to, if further adjustment became necessary after a year or so of operation.

### 3.2 Ivy Construction Company

3.2.1 Control Building: Findlay said he had ordered a hoist to be used in conjunction with the 85' Telescope at a cost of about \$6,600. This will include a tower which can be raised to a height of about 55 feet, with a working platform on the top. Berkner said that after Ivy had completed the control building a cement enamel finish should be applied. This can be done by an NRAO purchase order issued to the only company in West Virginia which does work of this kind. The cost will be about \$300.

3.2.1.1 The necessary trench for the cable between the control building and the telescope foundation is being provided.

3.2.2 Foundation: Callender said that the Ivy contract covers the necessary sidewalks and parking lot.

3.2.2.1 Check on Placement of Piers and Bolts: Emberson emphasized the importance of accurate placement. Heeschen will coordinate any and all necessary surveys.

3.2.2.2 Grout in Two Later Stages: Emberson said Ivy must be made to understand that the grouting for the telescope will have to be done in two stages. The first stage, around the bolts, is to be done before erection starts, but after the base plates are at the site for use in checking the templates. The second, grouting under the base plates, will be done after all other work is completed, including final alignment of the telescope.

3.4 Jasik Feed: Not discussed.

3.5 Precision Indicators: Findlay has interviewed all the bidders for fabrication of the precision indicators for the 85' Telescope. Three of the bids are below \$65,000. He proposes to wait about another week before selecting a contractor. His present judgment is that the best qualified bidder is Control Equipment Corporation, in Needham, Massachusetts. Callender pointed out that this company is decidedly light on working capital and the contractual arrangements must be carefully worked out.

Findlay expects to use part of the electronics budget to cover the extra cost of attaching the precision equipment to the dish.

## 4. 140' Program

4.1 Contract Status: Dunbar reviewed the last negotiating session with representatives of E. W. Bliss Company. There are comparatively few unsettled points in the contract. Bliss is pressing for a more liberal escalation clause, but probably this demand can be resisted. The warranty and tax articles require further

consideration. With respect to the warranty, final agreement must await the completion by Fold of computations on deflections in the reflector. Franklin Institute has not completed the specifications for the bearings, and before the contract can be settled the degree of Bliss's responsibility must be determined. The same applies to the drive and control. Dunbar said he hoped to meet with one of the Bliss representatives sometime during the week of May 12.

4.2 Structural Detailing: Carroll said he was by no means satisfied with the progress Bliss was making on the detailing, and he and Ashton will make every effort to expedite it.

4.3 Polar Bearings: Franklin Institute expects to have its design for the polar bearings completed by June 3.

4.4 Drive and Control: Findlay said he and Brown had completed performance specifications and a systems design. These will be used by Bliss in soliciting bids for a complete system. When the bidder has been selected, it will be necessary to check proposed components and determine what responsibility is to be assumed by Bliss and what by the subcontractor.

4.5 Materials: Emberson said use of the Navy steel at Charleston would not be practical, because it is armor plate and so cutting and welding would be difficult. Bliss has in stock most of the steel required, but will have to purchase some six inch plate for the polar shaft.

4.6 Interior of Foundation: Bowman will be asked to forward details on the foundation, including the interior finish, to Bliss not later than May 15. These must be in form sufficient for solicitation of fixed-price bids. The Bliss contract will include all the concrete and everything else that has to be set into the concrete. Completion of the interior can be covered by a change order to the Bliss contract, if Bliss's price accords with Bowman's estimate. Otherwise, it can be let by separate contract.

## 5. Budgets and Administration

5.1 Submittals in 1955-56: Berkner said a memorandum should be prepared documenting the assertions made by Sheppard with respect to the consistency of AUI's proposals. Dunbar agreed to prepare a draft. This memorandum should be in form to submit to the Trustees at the Executive Committee meeting on May 16, 1958.

5.2 Status of Request for Supplemental Appropriation: Emberson said Congressman Bow reported to Bliss that the Thomas Committee has not told the Bureau of the Budget to delay submission to the Committee of the NSF request for a supplemental appropriation. Bow is trying to persuade Thomas to bring up the request for funds for the NRAO as a separate budget item.

5.2.2 Other Support: Berkner described briefly the possibility of obtaining from other agencies support for the NSF request for a supplemental appropriation.

5.3 Operating Budget for FY 1959: Callender said he anticipated operating funds for FY 1959 would amount to \$400,000.



5.4 Provisional Budget for FY 1960: Callender said he expected that the operating budget for FY 1960 would be \$575,000.

Berkner said he would like to submit the FY 1959 operating budget, the provisional operating budget for FY 1960, and a preliminary budget for FY 1961 to the Executive Committee on May 16. He asked what estimate was being made of income which could be used to amortize maintenance costs. Burchill and Callender agreed that it would be impossible at this stage to produce any significant figures in income, and they would explain this to NSF. Berkner said budget estimates should clearly indicate the ratio of productive to non-productive staff. Visiting astronomers can be counted among the former.

5.5 Capital Budget for FY 1960: Berkner proposed that the capital budget for FY 1960 (which he wishes to submit to the Executive Committee on May 16) should include the following:

- 1) Wings one and two to the Central Laboratory;
- 2) Completion of Dormitory;
- 3) Site protection through acquisition of land and substituting underground for overhead cable;
- 4) Main power supply required to make up deficiency described earlier by Findlay;
- 5) Library;
- 6) Receivers, including a maser;
- 7) Laboratory furnishings;
- 8) Completion of maintenance building by addition of "Elephant House";
- 9) Other antennas, including a 300' fixed reflector.

5.6 Museum: Berkner wishes to have rough sketches and proposed location for the Museum for submission to the Executive Committee on May 16. The Museum will be devoted to the development of radio astronomy. The building should include a small lecture hall. Preparation should be made for regular lectures and guided tours of the Observatory. During the summer it may be necessary to hire someone to conduct this part of the program. Members of the staff can be relied on to take care of it during the winter. The suggestion that Research Corporation be approached for funds necessary to repair and set up the Reber telescope was approved. Berkner proposed that visitors be charged a dollar admission. The State of West Virginia and other appropriate private sources should be approached also for financial support. An appropriate brochure should be prepared. Berkner considers that the Museum should be ready by sometime early in 1961.

## 6. Other Programs

6.1 Very Large Antenna: Plans for the very large antenna should be pushed. Heeschen considers it highly desirable scientifically. Emberson will make efforts to get from Haddock a formal report on the meeting of the ad hoc committee on the

very large antenna which was held in Cambridge on April 21, 1958. Plans for study contracts should be pressed.

It is agreed that a meeting of the Advisory Committee in June or July will not be necessary and that a meeting should be scheduled for October 15, the Wednesday before the Trustees' annual meeting.

6.2 Calibration Horn: Findlay described his design for a calibration horn and the site he has selected. It will be about 120 feet long and will be made of welded aluminum sheets. It is designed to cover a wide frequency range.

### 6.3 Participation by Others

6.3.1 University of West Virginia: Berkner proposed that contact with the University of West Virginia should be re-established as soon as possible by Emberson and Callender.

6.3.2 Crote Reber: Reber wrote to Findlay listing some of the equipment he would like to use at Green Bank. Much of the electronic equipment is already on hand, but the machine tools must await a place in which they can be installed.

6.3.3 Noise in Blackouts: Berkner advised Findlay that the brief accounts of this subject in technical journals were not adequate, but that soon some classified information will be released. It appears that all radio astronomy will be affected. Some experimentation at NRAO may be desirable.

## 7. Building Program

7.1 Renovation Progress: Callender described the progress which has been made in renovating existing structures on the site. A house for Drake is ready for occupancy, and he and his family are moving in almost immediately (May 2). Good progress has been made on two other relatively small houses, and a larger house, which is intended to serve as a guest house, will be ready by August 1, 1958. It will have accommodations for five people.

7.2 and 7.3 Design for Works Area and Other Structures: The status of the design of the Works Area and the laboratory and residence hall and cafeteria were described. Berkner said the Bureau of the Budget has indicated that supplemental funds should be available by July 1, 1958. It may be possible to obtain permission to let contracts, on structures the design of which has been completed, before final action is taken and the supplemental appropriation finally passed, provided, of course, that commitments do not exceed the amount presently obligated under the contract. It might also be possible to commence work on some of the portions of the 140' Telescope, for example, the foundation, which can be separately priced and where delay in completion would be particularly damaging. The following course of action was agreed on:

- 1) Works Area: Bowman will be asked to have complete plans and invitations for bids ready by June 1, 1958. The invitation is to call for bids in three parts. The contract for the central part will be let as soon as possible. There will be two alternates covering the rest of the building. Work on the alternates will commence only on notice from AUI, which must be given within 30 to 45 days. The structure will be a prefabricated type with brick or stone facing at the bottom. Cost is estimated at about \$10.50 per square foot.

- 2) Cafeteria and Residence Hall: Bowman will be asked to have complete plans and invitations for bid ready by June 15. Re-design will be necessary so that part of the area presently planned for the cafeteria can be used as a lounge. The size of both the cafeteria and the kitchen should be substantially reduced, and costs will have to be cut to fit the supplemental appropriation. The housing will consist of two phases -- an initial one containing four apartments and 16 rooms, and a second phase consisting of two apartments and 8 rooms. Bidders will be asked to bid on the cafeteria and the first phase of the housing, and as an alternate on the second phase of the housing. Work on the alternate will go forward only on notice from AUI, which must be given within 30 to 45 days.
- 3) Laboratory Building: Bowman will be instructed to complete plans and invitations to bid by July 15. This will include only the central section of the laboratory.
- 4) Foundation for 140' Telescope: Bowman will be instructed to complete detailed design for the interior of the foundation by May 9, so that it can be submitted to AUI for review and then forwarded to Bliss not later than May 15. Bliss will be asked to quote a price for the foundation and to estimate the cost of finishing the interior, so that it will be possible to authorize Bliss to go ahead, under the letter agreement, with this phase of the work on or after June 15.

Berkner stated that no invitations to bid would be issued without the express approval of NSF and asked Dunbar to draft a proposed letter of authorization which he and Emberson will submit to NSF on May 5. Berkner also stated that no contractual obligation would be incurred in excess of the amount obligated to the prime contract.

Irving Bowman then entered the meeting and discussed the schedule described above. He said it could be met, although with some difficulty. If it is adhered to, Bowman would expect to have bids on the Works Area by June 30, on the cafeteria and residence hall by July 15, and on the central section of the Laboratory by August 22.

Bowman will furnish cost estimates for any work on finishing the foundation which is not covered by the Bliss contract. Carroll will at once provide him with detailed information showing the cut-off point between the foundation itself and the finishing of the interior. Bowman also will estimate and provide by May 9 the cost of the work which he is being asked to do.

#### Subsequent Meetings

Berkner announced the following schedule of meetings:

June 14	NRAO staff	at Green Bank
June 16	NRAO staff and NSF	at Green Bank

He is inviting Dr. Goldberg to attend both meetings.