38. Wood, interview with author.

39. Wilbur Claypool, interview with author in San Antonio, Tex., July 1978.

40. Claypool, interview with author.

41. Squibb, "Application for Federal Employment," and Squibb, "Diary" 23 June to 29 September 1933, Gaylord A. Knight Collection. McCabe says the cost on the Chelan was $5,000 and that the Olympic planned to invest $8,000. See Francis R. McCabe, "The Use of Radio in Forestry," (Senior thesis, School of Forestry, Oregon State Agricultural College, 25 April 1934), p. 29.

42. Squibb, "Application for Federal Employment."

43. F. H. Brundage to the Forester, 26 January 1934, Gaylord A. Knight Collection.

44. Brundage to the Forester.

45. Civil Service appointments to electronics positions in the Forest Service were at a premium during the Depression. Claypool had gone to Bonneville as a means of getting Civil Service status. When this was accomplished he transferred back to the Forest Service. Claypool, interview with author.

46. Claypool, interview with author.

47. Condensed from W. S. Claypool, "Memorandum for Mr. Mays," 23 September 1939, Gaylord A. Knight Collection.

48. See chapter 11, citations 44 to 47, for further discussion on this inspection.

Chapter X

A Dissenting Opinion:

Communication Plans and Practices in Region I

In a brand new thing like that we were bound to have divergent opinions.

- William B. Apgar[1]

On July 2, 1932, Frank Jefferson, the Northern Region's (R-1) Forest Fire Control Chief, wrote William "Bill" Apgar at Savenac Nursery in Haugen, Mont., to confirm an earlier discussion. Jefferson outlined a plan whereby Apgar and a man of his choice would be made available by Assistant Regional Forester Elers Koch for up to 5 days of firefighting. With each carrying two of the first type P and SP sets, they were to serve as a communication strike force for any fire in the Region. "The experiment that I have in mind," Jefferson wrote, "is that of using radio for the sole means of communication on fires remote from telephone and the general plan which I have in mind is that on call, you, with an assistant, will immediately proceed to the designated fire, install one radio set at the nearest telephone communication point, take the second set into the fire and establish communication between the two sets."[2]

This early selection of Bill Apgar to head the experiment indicates that the Missoula office was giving serious thought to the application of radio. Apgar was a 14-year veteran of the Service serving as the Assistant Forester at Savenac. He had earned a master's degree from the Yale School of Forestry where he wrote his thesis on grazing, then became interested in radio, and got amateur license W7CRU. He had become aware of a need for more effective communications after an early experience in R-1 with the heliograph when he was a fire guard at the Castle Butte lookout station on the Lochsa Ranger District, Clearwater National Forest, northern Idaho.[3]

Described as a "nice guy" by his superiors and coworkers, Apgar had a penchant for perfection, and he pursued his new assignment with alacrity and force.[4] He was never one to shun responsibilities or yield to adversity. He adopted a demeanor that reflected this attitude as well as his belief that Region 1 was a tough place to work and it took tough men to meet the challenge. He always went into the field with a Colt revolver strapped to his hip, although he was never forced to use it. During his 20-year tenure as the Regional Communications Officer he said he never thought of himself as a "communication man," but as "a Ranger who used electronic communication to get a job done."[5]

Figure 101. Loading radio supplies aboard Ford trimotor airplane of Johnson Flying Service, longtime contractor for the Forest Service, at Missoula, Mont., in the 1930's. William Apgar, Region 1 radio chief, stands near plane. (Forest Service photo, History Section)

Apgar's efforts during the 1932 radio experiments were hampered because the semiportable SP sets were not yet completed by the manufacturer.

Jefferson suggested that Apgar "...try to contact Calder /Idaho/ with the portable sets and get what you can out of that phase of the experiment."[6] At Calder, Harold Lawson was completing installation on the St. Joe Forest when Apgar wrote asking him to maintain a daily radio schedule. "We will begin calling on the hour, calling for five minutes and listening for five minutes, for a period of half an hour," he wrote. Apgar then added, "We have also logged the /Calder/ portable sets with our portable sets so I see no reason why we cannot get through."[7]

After this limited experiment, Apgar began to prepare for the 1933 fire season with a flourish. He got authorization for the purchase of 47 additional sets, including 2 M sets, 2 SSP sets, 24 SP sets, and 18 PF sets. He did not get any additional P sets.[8] In a myriad of

Figure 102. Field demonstration of the Radio Laboratory's SP (semiportable) radio by Richard Ogg of Region 1 mobile radio unit (Station W7AOD), at a temporary lookout station, ca. 1933. Ogg is using alidade (fire locator) attached to tree. Note binoculars on equipment kitbox, which was used to carry the SP set, antenna, and heavy-duty batteries required for semipermanent locations. (Forest Service photo, History Section)

fire season experiments primarily conducted between planting camps and the nursery, Apgar was able to tally 6,792 separate communication contacts. After subjecting the call logs to careful scrutiny, he concluded that this number represented a successful completion rate of 96.5 percent.[9]

Not content to drop the experiment after the fire season, Apgar established a winter radio network, or point-to-point contact, among the Clearwater, St. Joe, Lolo, and Flathead National Forests, the Savenac Nursery, and the Priest River Experiment Station. "...It seems safe to say," he concluded after this latter phase of the experiment, "that the sets have more than paid for their use in the decrease of long distance telephone charges."[10] Venturing one step further, Apgar ruminated on the "future use" of radio in Region 1 and concluded that "the installation of appropriate sets for the Forest necessitates a Forest as well as a Regional radio development plan."[11] One year later, he took a major step in this direction with the installation of an M set in Missoula for the "administrative use of radio." "Daily schedules with sets all over the Region" were reported.[12]

Another interesting conclusion drawn by Apgar from his 1933 experiments was that the SP and PF sets were unsatisfactory for Region 1. "Services other than for lookouts," he informed the Laboratory, "frequently reach from 50 to 100 miles and it is here that we notice the lack of power to consistently enable two-way communications." Expanding on this thought, he stated that "our aim" over these distances is a 95 percent reliable transmission rate. The SP and PF could not achieve this performance. Because these sets were designed to operate out to distances of only "10 to 25 miles" Apgar rated

their performance a "failure" at the longer distances.[13]

Conflict with Radio Laboratory Started Early

The significance of these experiments and findings should not be overlooked. By this early date, the evidence seems conclusive that Region 1 had seen a use for radio in serious conflict with a number of current situations, namely, the Laboratory's philosophy of low-power portability, Washington Office agreements with A. T. & T. and IRAC regulations. The Region's establishment of interforest networks for point-to-point contact, the emphasis on fixed-base stations, and the redefinition of semiportable radio all support this contention.

In retrospect, it is not clear whether Major Evan Kelley, the Regional Forester, and his staff influenced Apgar to take this stand, whether Apgar persuaded them, or whether impetus came from both directions. It is possible, for instance, to reflect on Jefferson's 1933 memorandum to Apgar and conclude that the Regional office planned to use radio only as a relay from the fireline to the nearest telephone line and then to the Regional office. If this were so, the administrative staff in Region 1 probably intended to use radio only for network hookups. It will also be recalled that, coincidentally, Harold Lawson was making the first field installation in the National Forest System over on the St. Joe National Forest in Region 1. Why then, it might be asked, didn't the Missoula administrative staff duplicate this system elsewhere in the Region?

In all fairness, it should be pointed out that some former Region 1 employees believe that population was too sparse and field personnel too widely dispersed in the northern Rockies in the 1930's for the Lab's system to be possible. Communication distances of 50 to 100 miles were indeed common. With wilderness and vast uninhabited spaces the rule rather than the exception, it was not realistic to expect a smokechaser to be within 15 to 20 miles of another radio set all or even most of the time. As long as production of the Radio Laboratory sets fell short of this need, Apgar would have to devise a scheme for men in the interior to get their messages out. Probably a system employing high-powered, fixed-base units at Ranger stations and high-powered, semiportable sets for men on horseback with pack string would have served this purpose. (See William Morton's comments in chapter 15.)

The proponents of low power, however, are quick to point out how hastily a Regional network was set up between the various forest headquarters in Region 1 and the Missoula office. Given the regulations dictated by IRAC and the A. T. & T. leases, the network concept transcended the bounds of prudence, if not legality. Furthermore, the low-power proponents contend, the entire Region was not wilderness. Forests such as the St. Joe could have been readily adapted to low power. Because this strategy was rejected out of hand by Apgar, the implication is that other motives were responsible for Region 1 opposition. Low power advocates also point out that this attitude led the Region to reject such valuable new technology as vhf. Once the Regions's 3-MHz network was established, the justification for retaining it would have to be that the lightweight portables could not fit into the network scheme, and that vhf had no use because it could not be used with the established hf network.[14]

There is evidence that Region 1 and the Radio Laboratory had undertaken a joint effort in early 1934 to design the most practical communication plans for the St. Joe National Forest. After Lawson's installations were complete, Frank Jefferson wrote the Laboratory on January 9 to ask about the possibility of adding vhf to St. Joe. Lawson replied with a two-page recommendation and a map outlining a proposed hf/vhf network.[15] The recommendations focused on vhf use between selected primary lookouts and the St. Joe headquarters in St. Maries. Supplementing this network would be a fire network of hf sets. Lawson envisioned type PF sets (100 meters) used for portable fire applications in conjunction with SSP sets (100 meters) in the lookout towers. Communications between St. Maries and the lookouts could then take place on the vhf frequency (10 meters) without interfering with the portable radio fire channel.

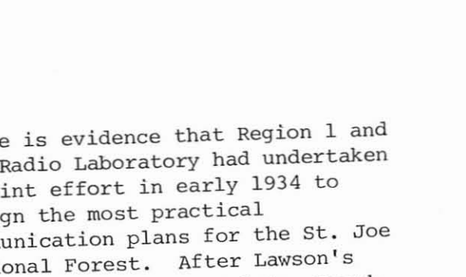


Figure 103. Harold Lawson's pioneering vhf/hf network plan for the St. Joe National Forest, Idaho, 1932. (Forest Service photo, History Section)

Bill Apgar did not implement Lawson's suggestions even though he thought that 10-meter vhf sets on some lookouts would "help in relieving traffic."[16] Two years later, while professing to believe there was still a "distinct use for ultra-high frequency (vhf)," he still was not prepared to say how important this use would be because vhf was "still in the experimental stage."[17] Seven years later, after the Laboratory development of the vhf types S, T, U, SV, T/D, SX, KU, and the introduction of the RRS automatic relays, it was evident that Apgar's motives were not founded on technical considerations. He thought vhf was of "no practical use" in Region 1, and he prevented its adoption.[18] All elements of the Regional network system had to conform to the 3-MHz frequencies for administrative, long-distance communication.

The significance or even recognition of the potential collision course between the Radio Laboratory and the Missoula office was some time in developing. At first, this was mainly due to total confusion over the apparent lack of acceptance of radio as a Servicewide tool and the low expectations of the Washington Office. In January 1934 Earl Loveridge wrote to Assistant Chief Roy Headley, "I wonder if we should not face the fact that our radio sets are not rated as having much value, outside of Region 6?"[19] He could not escape the conclusion that he might have been oversold on the idea, even though he had "...the greatest confidence in the ability in radio matters of Simson and Horton."

Loveridge reviewed the information he had received on Regions 1, 4, and 5--considered most likely to benefit from radio--and was discouraged by what he found. His respect for Simson's and Horton's opinions, "together with their bubbling enthusiasm and confidence, and their ability to describe or suggest glowingly the progress being made in forest radio development," he continued, "has kept me from realizing that the other Regions are not only non-enthusiastic but actually cold toward the idea of using the sets that have so far been developed."[20] The following were among the points he made:

> Region 1 (Missoula)--Radio was used only under the direct sponsorship of Simson or Lawson. If they were not present "...there is practically no use of radio ... or any appreciable talk about using it on project fires, etc." /This appears to be an inaccurate appraisal of R-1's actual use of radio./
>
> Region 4 (Ogden)--According to Francis Woods the men had no success with the few sets they had. "This is not a typical attitude in Four to worthwhile innovations."
>
> Region 5 (San Francisco)--For the Region as a whole, including the attitude of the Regional Officers, little thought or consideration is evident as to the possible use of the Beatty-Simson sets."[21]

Loveridge recommended to Headley that an impartial board be established to look into the problem. To insure unbiased results, he suggested that the Board take the sets into the field, turn them over to the appropriate personnel, and then observe the results. "If, instead, Simson or Horton are allowed to manipulate the radios for the Board and Lorelei them with convincing talks and demonstrations, rather than tackling the problems exactly as the ordinary recipient of the sets has to tackle them, the investigation will be of little value."[22]

Roy Headley did not follow these suggestions to the letter. Instead he responded in line with the established decentralized policy that allowed each Region to determine its own radio applications. In a letter to all Regional Foresters on January 9, 1934, he made it clear that each Region had Washington Office approval to utilize radio as a communication device. But his major concern was undoubtedly based on his memory of his experience with Ring Bell Adams in the early 1920's, and he feared that money might be spent unwisely. Including an edited draft of Loveridge's memorandum with his letter, Headley posed the following questions to the Regional Foresters:

> What about the enclosed memorandum by Loveridge?
>
> We spent quite a lot of money on the gambling proposition that we could develop practicable radio equipment for our work. We succeeded far beyond our most sanguine expectations--or we thought we did. But the equipment is accepted and put to use practically only in the Region in which it originated.
>
> It is time to find out what is the matter. Have we been all wrong in thinking we have developed a valuable and practical new tool? Is it lack of money that stops it from being introduced? Are we merely up against another case of the "inertia of even informed minds?" Have we handled the research end of it well only to fall down some now in organizing the application of the results of the study? Or what is the matter?
>
> Do not misunderstand me. I am no longhair advocate of radio as a solution of all fire problems. I know it has distinct limitations. But if it is a real tool, I see no reason why we should not use it

in its proper field more promptly than we seem to be.

Whatever we do, let's don't drift and stall. Let's not again take 10 years to learn a new tool that should be learned in 3. And if the tool is no good let's find out and act accordingly.[23]

Nine days before the answer date, Lewis Stockdale, Assistant Regional Forester for Operation in Region 1, sent a four-page reply to Headley. The tenor of the response was decidedly defensive:

It is somewhat of a jolt to learn of the low opinion in which Region One's volume of radio use is held in your office. We had thought (just among ourselves) that we were making nice progress in extending the use of this new tool. Perhaps we are wrong in this assumption, or perhaps we just have not made noise enough about the use that we are making of radio.[24]

Proceeding to make some "noise" on the subject, Stockdale outlined the 2-year history of radio in Region 1, pointing out that the Region now had 59 sets. During the previous season, the Region had relied on radio on the Coeur d'Alene National Forest in Idaho for practically all communications in one Ranger District and about half in another Ranger District. In addition, radio was used in tree planting camps; for regular service between Savenac, Priest River, and Missoula; between the Ranger stations on the Clearwater National Forest, also in Idaho, and for point-to-point communication.

Stockdale conceded that the Region could have accomplished more. However, he reported, the consensus of the Regional Office was to "make haste slowly" during the initial phase of radio development. In the opinion of those in charge, there were three "sound" reasons for this approach. First, because staff had to familiarize themselves with application possibilities, they had limited purchases to a "reasonable number of sets" for test purposes. Secondly, they recognized that they would have to "sell the idea" and thought it "unwise" to attempt to "high pressure" radio use. Finally, there was a "lack of assurance as to permanency of current radio development."

Elaborating on the last point, Stockdale thought they had acted in a "canny" manner by delaying further purchases until the "bugs" were out of radio and it had a chance to "shake itself down." After pointing out the obsolescence of the P set, the development of the M, and the "promise" of vhf, he also noted that "...it has not been possible to plan intelligently for radio distribution and use, /because/ the service deemed impossible today becomes a possibility tomorrow, and a certainty by the following morning." Stockdale assured Headley that the Missoula office was "...much better prepared now to proceed with such planning than we were two years ago, and you may be assured that in this planning radio will be given a fair chance to compete for the furnishings of communication service."[25]

Apgar Put in Charge of Radio

In support of this commitment, Stockdale notified Elers Koch that Apgar would be put in charge of radio and telephone work in the Region.[26] In a letter to Apgar one month later, Jefferson outlined the duties of the new position. Many of the points made in Stockdale's memorandum to Headley were repeated, but there are several significant contradictions between the memorandum sent to Washington and what the Region really had in mind.

"Your immediate job," Jefferson wrote to Apgar, "...is to get into effective use the radio sets which are now in the Region..."[27] Until that was accomplished, Apgar was to be very careful in proceeding further with investment in radio. Cautioned Jefferson, "We have a relatively large number of sets /59/ in the Region now and until we have placed these to the very best advantage we should refrain from further investment." But the most surprising comment was that "we do not consider radio (at present) as being a practicable tool for a fireman to carry with him into the woods;..."[28]

Even before his appointment to the new post, Apgar received a folder of correspondence from each Forest Supervisor. In apparent response to a Regional query, each had summarized his communication equipment and experiences. The response to radio in general was favorable overall, but a number indicated problems with low power, crowding on the single frequency, and the appearance of '...more *absolutely useless* and *time-consuming guff* on the radio than is ever heard on a party telephone line."[29] For every criticism against portable use, however, there was corresponding praise for PF operation.

After convincing the Regional Office that more sets were necessary for the 1934 fire season, Bill Apgar drew up new communication plans for seven National Forests. It is apparent from these plans, the records of 1933, and the 1935 purchases, that he carried out the Regional command to ignore portable radio "for firemen to carry into the woods." Table 3 shows the preponderance of fixed-base M sets and higher-wattage, semi-portable SSP sets that provided the majority of early communication in Region 1.

Gael Simson and Harold Lawson at the Radio Laboratory, Jack Horton in Region 6, Earl Loveridge as Chief of Operation, and Roy Headley as Assistant Chief Forester in the Washington Office would all eventually provide formidable opposition to the Region 1 emphasis upon higher power and point-to-point communication. They held that the telephone was to be used for matters relating to general administration; radio was to be reserved for the primary use of men in the field. Their concepts differed vastly from those in the Missoula office. One group planned from the bottom up, the other from the top down.

Table 3.--Active radio sets, Region 1, 1933-1935

	Class					
	Fixed Base	Semiportable		Portable		Experimental
Year	M-20W	SSP-5W	SP-1W	PF-3½W*	P-1¼W	vhf-2W
	(Number of Active Sets)					
1933[30]	3	2	29	18	7	-
1934[31]	21	39	23	17	-	2
1935[32]	42	118	23	17	-	10

* The existence of a 3 1/2-watt PF set is questionable. (See appendix I.) There was some discussion of increasing the power of the PF. However, no records indicate that this occurred to any measurable extent.

Major Points of Contention

There were four major points of contention: (1) the adequacy of low-cost lightweight, low-power sets vs. heavy, high-power sets; (2) the financial waste of duplicating existing telephone equipment and service with radio; (3) the hazard of and the potentially lasting penalties for violating both Federal frequency assignments and the agreement with A. T. & T. (Bell Telephone Co.); and (4) the high equipment cost of establishing high-power Regional radio networks for broad administrative functions.

Region 1's Apgar Radio Network Plan held that lightweight sets could not fulfill the unique needs of the Region; Bill Apgar would have preferred "portable" sets like the 5-watt SSP[33] even though this would represent almost a two-fold increase in weight that would definitely take these units out of the lightweight class.[34] He did not see this redefinition of portability as a problem; he thought of communications from the opposite end of the spectrum. With a central, high-powered station at Missoula, plus M sets of 20 watts, or higher,[35] on each National Forest and Ranger District, his definition of a "portable" unit would be whatever was necessary to reach the network. If this required enough power to reach 50 to 100 miles, or a 50-pound set, that was how Apgar would define portable.

Another reason Washington opposed converting to a sophisticated system was its high initial cost, due in part to the waste and expense of duplicating current telephone lines or replacing them with radio. In addition, even if questions of technical reliability were ignored, the process would have been time-consuming; it could require a decade of anguish and argument over budgets and earmarking of specific funds. In addition, many CCC camps were assigned to maintain and construct telephone lines throughout the National Forest System.[36] To ignore this windfall of a ready-made, all-expense-paid labor force, as Apgar was suggesting, bordered on fiscal irresponsibility.

The third and perhaps the greatest concern of the Washington Office and most Regions with point-to-point communication was the threat of violating both IRAC regulations and the substantial toll-line discount agreements with A. T. & T. Following several calls from a representative of the Bell Telephone Co., Roy Headley wrote the Regional Foresters in 1935: "Their concern has always been with stories that radio is to supplant regular pole line service between Regional offices and somewhat distant supervisors' headquarters," or "point-to-point" communications.[37] As a reminder, Headley noted that the IRAC legal authorization associated with the Forest Service frequency allocations did not allow this use. The seven IRAC rules specifically outlining the limits of Forest Service radio application read as follows:

(1) /For/ emergency calls from points which are not connected by regular telephone lines.

(2) For intermittent contacts with mobile crews.

(3) For connection with points which cannot, practicably, be connected by telephone lines because of topographic barriers.

(4) To connect with points which are occupied so infrequently, and of such short durations, that investment in wire communication is clearly unjustified. The bare comparison of costs of radio vs. telephone lines is not a proper basis for determining the type of equipment to be installed.

(5) /For/ very infrequent contacts between supervisor's offices or other more distant points not connected by satisfactory commercial lines, but only when such calls can be clearly justified as not being in violation of the spirit and intent of the authorization granted us.

(6) To communicate with CCC camps and other temporary camps for which no other means of contact are available when justified by local conditions.

(7) Radio should not be used for point to point contact for general administrative business in the frequency band 3000-3500 k.c., since these frequency allocations are required primarily for fire communication purposes.[38]

Figure 104. Checking in a Civilian Conservation Corps (CCC) crew after a fire. Olympic National Forest, Wash., 1939. (NA:95G-380066)

At the 1936 Spokane Fire Equipment Conference, the Apgar Plan was soundly opposed in a Radio Committee report. Reiterating the seven mandatory IRAC communication rules, the Committee emphasized its support for the telephone agreement. "In order to forestall needless alarm on the part of the A. T. & T. Co. that Forest Service radio is unnecessarily infringing on their utilities, the report stated, it is recommended that sufficient contact be maintained with local A. T. & T. Co. representatives to insure their full awareness of Forest Service radio activities insofar as these activities might be construed as affecting them."[39]

A fourth criticism from Washington was the lack of economy of Apgar's plan; they contrasted the low costs associated with simplicity of design with the high costs of higher-powered transmitters and more sensitive receivers. The Radio Laboratory's policy was to keep radio design simple, but the equipment requirements for long-distance network communication rose proportionately with the complexity of the technological design. The more refined and complex a circuit, the more labor and components required, and the higher the cost.

Whether Apgar could have the Region 1 funding to implement his plan in its entirety is theoretical; this possibility was not settled until much later. By championing the program, however, Apgar brought himself into direct conflict with the Radio Laboratory.

The Laboratory philosophy for radio design and development was simplicity, ruggedness, and dependability. To paraphrase Simson, a set should be built for operation by a mule. This did not suggest a lack of confidence in the mental capacity of firefighters.

Instead, it reflected the realization that they were not trained radio operators, and in addition were often under stress comparable to that of soldiers in combat. Pressed to get a message transmitted at a time when seconds were important, a nontechnical radio operator did not have time to go through the numerous tuning procedures required to operate complex equipment.

Region 1 Used Amateur Radio Men on Fireline

Bill Apgar was undaunted. He challenged the Radio Laboratory's concept of a radio operator on the fireline. By the second year of Region 1 radio use, he redefined the profile of the typical radio operator on the fireline. He canvassed the Region to come up with a list of 26 men who would make themselves available as paid volunteers at various times for fire radio operation. It held the names of 12 men from Spokane, 6 from Missoula, and 8 from other areas around the Region. All but one held an amateur radio license.[40]

Like other Regional communication officers, Apgar always considered one of his primary and most difficult jobs to be to "sell" radio to the men in the field. By planning to use men well-versed in radio operation, he could virtually circumvent the need for simplicity of design. Men who could take a radio apart and put it back together were not frustrated by complex tuning procedures.

The procedure Apgar planned to use for these ham radio operators was similar to that of a civilian defense program. When word of a major fire arrived, he would notify the first man on each of three lists; the men notified in turn would secure the number of required radio operators. In case of a bad fire season, a powerful base radio station would be established at Missoula as a communication center relaying telephone messages to the Regional fire desk.[41] With trained operators on the higher-powered radio sets at fire base camps, the Missoula fire boss could coordinate and direct fire crews by radio like a behind-the-lines commander.

Over the years, Bill Apgar continued to add to his list.[42] He acquired names for the "Mobile Radio Unit" by advertising for amateurs over a Spokane radio station, spreading the word through amateur radio channels, and sometimes knocking on doors when he heard a practiced "fist" sending a message. If a few happened to be natives of nearby Canada, they could "become" U.S. citizens for the fire's duration by selecting a temporary hometown of their choice from a map of Region 1.[43]

But even though Apgar eventually had the name of every available amateur in the Region, this plan did not become the recommended policy of the Radio Laboratory. The use of temporary, seasonal radio operators went against the grain of contemporary Forest Service philosophy and policy. Not only was employment of outsiders contrary to tradition,[44] but it also provided a higher level of technical competence than called for. Radio was being developed as a tool for men already a part of the Forest Service organization. To provide them with a radio that went beyond their skills and, more importantly, their needs, would have severely limited the use of radio. In the battle against fire, a strategic weapon that can be operated only by highly skilled personnel may fail totally if the operator is disabled or absent. The weapon must be designed for use by almost any soldier, otherwise

spectacular successes will be overshadowed by colossal failures and a resulting lack of confidence in the device.

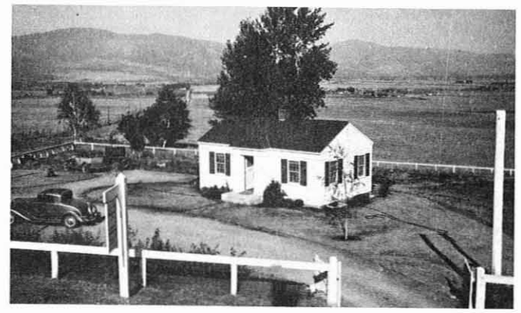
Bill Apgar had a great deal of respect and admiration for Regional Forester Kelley. He was a man, Apgar remembered, who "wasn't afraid to tell Washington what to do."[45] In turn, Major Kelley appeared to respect Apgar's position and supported his attempt to develop the network concept. In a 1936 letter to Chief Forester F. A. Silcox (who had preceded him in Missoula), Kelley questioned the limitations placed on Region 1 by the A. T. & T. leases and IRAC regulations. He described the Missoula station to Silcox and explained its responsibilities for maintaining communications on project fires, relying messages to and from the fire desk, coordinating airplane patrols, disseminating fire-weather warnings, monitoring frequencies to prevent interference, and providing other miscellaneous services.

Kelley believed radio was important to speed daily reports to Missoula, where tabulations were made and responses or orders returned. "If you want to consider it as such," he reported to Silcox, "it means a total of nine hundred messages distributed in thirty minutes," a fact, he added, that is "absolutely impossible to accomplish except by using radio." Uneasy about IRAC frequency regulations, Kelley said there would be no interegional interference and asked Silcox to reconsider the question. "I see no reason," he added for good measure, "why this network cannot continue to function, but since there is a difference of opinions we would like a decision on it."[46]

The response from the Washington Office is not available. It is significant to note, however, that a few months later, after Apgar conducted numerous propagation tests, Region 1 authorized Apgar to purchase a site for a Regional radio operation center in the Whitaker hills above Missoula on the eastern edge of town. The transaction was completed in 1936 "for $1 and other considerations."[47]

The KBCX Operation at Missoula

Much later, Bill Apgar remembered the Operations Center (KBCX) as a "beautiful" location for Regional communications. A CCC crew put



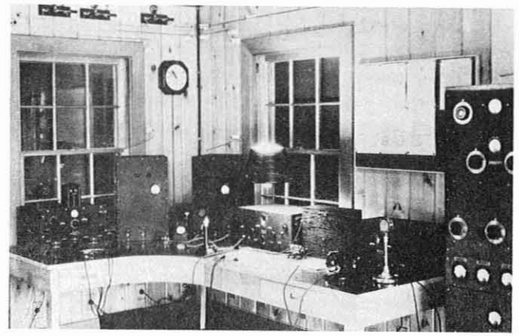


Figure 105. Exterior, above, and interior, below, Region 1 Radio Operations Center, Station KBCX, Missoula, Mont., 1937. (Forest Service photos, History Section; NA:95G-331156).

the building up. It was divided into two sections, with one room for communications, one for a service shop. Living accommodations were in the basement. A crew, hired by Apgar mostly from CCC trainees, occupied the center around-the-clock.[48] Transmissions from the National Forests around the Region were clear and suffered little interference.

To strengthen his position on high-powered communication, Apgar set out to acquire up-to-date equipment. He selected two of the popular Hammarlund Comet Pros and an improved Super Comet Pro for reception. For transmitters, he utilized two type M sets and a custom unit of his own design that he had used earlier for a base station at Ft. Missoula and the University of Montana. Rated at "something over 100 watts," Apgar's transmitter had sufficient power to maintain 100-meter communications with all of the National Forests in the Northern Region.[49]

Beginning in 1932, Bill Apgar had a considerable effect on radio application throughout Region 1. In the early communication plans, he employed M sets at Forest Supervisors' offices, 5-watt SSP sets for Ranger stations and a combination of SSP and SP sets for use primarily at Blister Rust Camps (BRC) in the interior.[50] He also passed on his attitudes toward high power to many Rangers through a program of radio indoctrination seminars on the individual National Forests he began in 1934.[51] Any sentiments for use of low-power portable radio by smokechasers could be overcome in these meetings by arguments on the importance of administrative radio. It is not surprising to find that when the Regional office called on each National Forest to draw up extensive radio and telephone communication plans, "the job of contacting Forest and building this plan has been assigned to William Apgar...," and "he will make it a point to visit each Forest as soon as possible, in order to get the plans organized and in effect so that the necessary work to complete the systems in accordance with the plan can be accomplished during the next fiscal year."[52]

The communication plans that Apgar made between 1935 and 1937 for each National Forest in the Northern Region were examples of efficient organization and purpose.[53] He also thoroughly evaluated existing and required telephone services. The plans, however, varied and were somewhat limited in scope, but they generally centered on the strategic location of a type M set and an SP, SSP, or SPF set on each Ranger District.[54] Each document was approved by the Forest Supervisor, Assistant Regional Forester Clarence Strong, and the Improvement Inspector, Clyde P. Fickes, carrying with it the implication of fixed Regional policy. This policy remained in effect until 1940-41 when Apgar undertook a general revision of these plans.

The degree to which Apgar centralized Regional communications through Missoula was also evident in his approach to radio service and maintenance. Once each year, usually in the spring, the Forest Supervisors were asked to gather up all radio units for annual inspection by a traveling KBCX Operations Center technician.[55] This particular policy irritated Forest Supervisor Ray R. Fitting on the St. Joe. He had found this type of maintenance unsatisfactory in the past, not only because it was inconvenient, but

because the sets often came back in worse shape than when they left. In addition, the timing of this service was counter-productive. Fitting argued against their removal when they were most needed to communicate with work crews and CCC camps. As an example, he noted in a letter to F. E. Thieme, Assistant Regional Forester and Chief of Engineering, that "I have delayed calling in the radio equipment from CCC camps due to the fact that during the past ten days a great deal of trouble has been experienced in connection with keeping the /telephone/ communication system in working order on account of high water."[56] With the usual springtime snowmelt and runoff, the telephone lines, which ran up through the mountain valleys, were vulnerable to the vagaries of nature.

To keep the radios in working condition, Fitting had earlier hired Dave Brown, a St. Maries resident, as a radio technician. Brown was able to inspect the sets at their installation sites with a minimal amount of inconvenience and downtime. But this approach did not please the Regional Office. In a return letter to Fitting, Thieme pointed out that radio was still in its "infancy," and required many modifications best handled by the "Regional office specialists." Thieme suggested that "until the number of sets on the Forest reach the number where they will warrant the hiring of a man to look after them, a specialist from the Regional Office who will handle the work on a number of Forests appears to be the most economical and would cut down on general overhead expenses."[57]

The matter might have been settled had not Apgar chosen to defend his group against Fitting's complaints. In a disparaging memorandum to the Engineering Branch, Apgar insisted: "If these sets were inoperative when received in the field it was due entirely to careless handling from the time they left St. Maries until received in the field."

Before signing the correspondence with the unusual title, "In Charge of Radio," Apgar complicated matters by questioning Brown's qualifications as well as the administrative abilities of those in charge of the St. Joe. "Dave Brown is a very good man..." he wrote, "however, I would not consider him an experienced radio technician and what is more I do not believe Mr. Brown would so classify himself." He seemed compelled to continue: "For some reason, the St. Joe Forest has had more trouble with radio communication that all other Forests in this Region combined." And then, to top it all, Apgar tersely commented, "Mr. Fitting's letter is typical of the attitude on the St. Joe."[58]

Fitting told the Regional Forester he was not impressed with the status of anyone "In Charge of Radio." The St. Joe Forest Supervisor flatly declared "...that there is no need for the Regional Office to plan on sending a radio man in to overhaul the sets,"[59] he pointed out the specific "unsatisfactory conditions" of previous inspections, the satisfactory background, training, and qualifications of "Mr. Brown," and the value of having a man for on-site work. In a parting shot, Fitting left little to the imagination: "In my opinion, he /Brown/ is the most competent service man that we have had working on the sets, with the exception of Mr. /Harold/ Lawson..."[60] Exemplifying the influence that a supervisor could wield over his domain, Dave Brown was retained as the St. Joe Forest radio technician. As of

1979, he had completed 43 years of continuous service in that capacity, all on the St. Joe National Forest.[61]

The Region 1 relationship (in a rare similarity to other Regions) with Mountain States Telephone and Telegraph Co. (M. S. T. & T.) and numerous other private exchanges was very cordial and cooperative. Charged with joint radio and telephone responsibilities, Apgar received his training in telephone line construction from M. S. T. & T. and utilized their construction practices throughout the Northern Region.[62] Nevertheless he showed a decided preference for radio over telephone. A measure of this attitude is reflected in the figures for telephone lines in the Region. After reaching a high point of 12,650 miles, they dropped to only 1,164 miles of line by 1977,[63] and Dave Brown sent a Christmas note to the retired Bill Apgar indicating that not only were the differences of 1936 forgotten, but that their attitudes regarding telephone were similar. "Our dream has come true. The last Forest Service telephone line on the St. Joe had been replaced by radio."[64]

During the first few years of Forest Service radio, Region 1 was well on the way to developing the concept of network radio. With the high-powered station in Missoula and M sets in the offices of each Forest Supervisor, the principle of administrative communication had been established. By adding semiportable sets to Ranger stations, lookouts, and guard locations, and Regional Office in Missoula could achieve almost instant communication with all inhabited locations in the system.

Many problems--IRAC regulations, A. T. & T. leases, and the questions of interference and portable radio for the fireline--were yet to be overcome before the Missoula office could proceed with its plan. The technology required to produce portables that could be carried by an individual and reach 100 miles, and the ever-increasing interference as radio inventories doubled each year, also raised questions that went beyond IRAC and A. T. & T. regulations. The answers would not come easy for the Forest Service.

Reference Notes

1. William Burnett Apgar, interview with the author in Sun City, Ariz., January 1978.

2. Frank J. Jefferson, "Memorandum for Mr. Apgar," 2 July 1932, Gaylord A. Knight Collection.

3. Apgar, interview with author.

4. This description of Apgar was provided by George Duvendack. See George Duvendack, interview with the author in Bozeman, Mont., May 1979, Gaylord A. Knight Collection.

5. Apgar, interview with author.

6. Frank J. Jefferson, "Memorandum for William Apgar," 6 August 1932, Gaylord A. Knight Collection.

7. W. B. Apgar to Mr. Lawson, 9 August 1932, Gaylord A. Knight Collection.

8. W. B. Apgar, "Radio Report-1933," 27 February 1934, typed copy, Gaylord A. Knight Collection. These figures are approximate and were determined by deducting the portable sets which Lawson had on the St. Joe (1 M, 5 SP's, and 5 P's) and Apgar's two 1932 sets.

9. Apgar, "Radio Report-1933."

10. Apgar, "Radio Report-1933," p. 3.

11. Apgar, "Radio Report-1933," p. 7.

12. W. B. Apgar, "Radio Communication Report-1934," [n.d.] [ca. late 1934-early 1935], typed copy, p. 1, Gaylord A. Knight Collection.

13. Apgar, "Radio Report-1933," p. 4.

14. In the reading of the preliminary manuscript, two individuals questioned the emphasis placed on Apgar, or the attention to his actions. I have, therefore, taken this opportunity to emphasize that the issues were technical, not personal.

15. L. C. Stockdale to H. K. Lawson, 9 January 1934 and H. K. Lawson to Regional Forester (R-1), 13 January 1934; both Gaylord A. Knight Collection.

16. Apgar, "Radio Report-1933," p. 8.

17. Elers Koch to the Forester, 9 April 1935, Gaylord A. Knight Collection.

18. Apgar, interview with author.

19. E. W. Loveridge, "Memorandum for Mr. Headley," 6 January 1934, Gaylord A. Knight Collection.

20. Loveridge, "Memorandum for Mr. Headley."

21. Loveridge, "Memorandum for Mr. Headley."

22. Loveridge, "Memorandum for Mr. Headley."

23. Roy Headley to Regional Foresters, 9 January 1934, Gaylord A. Knight Collection.

24. L. C. Stockdale to the Forester, 20 January 1934, Gaylord A. Knight Collection.

25. Stockdale to the Forester, pp 2-4.

26. L. C. Stockdale, "Memorandum for Mr. Koch," 12 March 1934, Gaylord A. Knight Collection.

27. Frank J. Jefferson, "Memorandum for Mr. Apgar," 14 April 1934, Gaylord A. Knight Collection.

28. Jefferson, "Memorandum for Mr. Apgar," pp. 1, 2.

29. F. A. Williams, "Use of Radio at Planting Camps," 8 February 1934, Gaylord A. Knight Collection. Each of the letters was initialed "WBA" indicating Apgar's knowledge of same.

30. Apgar, "Radio Report-1933," p. 1.

31. Apgar, "Radio Communication Report-1934," p. 1.

32. Elers Koch to the Forester.

33. Apgar, "Radio Report-1933."

34. Apgar, interview with author.

35. Apgar, "Radio Report-1933."

36. Wilbur Claypool, interview with the author in San Antonio, Tex., July 1978; Apgar, interview with author; Gaylord A. Knight, interview with the author in Atlanta, Ga., November 1977; Guy V. Wood, interview with the author in Porterville, Calif., January 1978; and Harold K. Lawson, interview with the author in King City, Ore., May 1978.

37. Roy Headley to Regional Foresters, 25 April 1935, Gaylord A. Knight Collection.

38. Headley to Regional Foresters, p. 2.

39. A. G. Simson, "Report of Radio Committee-Spokane Fire Equipment Conference," 19 February 1936, Gaylord A. Knight Collection.

40. W. B. Apgar to Frank J. Jefferson, 3 May 1933, Gaylord A. Knight Collection. The leader was Paul Dickman (W7AQM) and the group included H. V. "Gravy" Graves (W7CEG) and Russell Richmond (W7CRH), a Northwest Airlines pilot.

41. W. B. Apgar, "Memorandum for Mr. Jefferson, 23 May 1934, Gaylord A. Knight Collection.

42. Apgar updated the list each year. By 1941 there were 32 amateurs between Spokane, Billings, and Kalispell. See "Mobile Radio Unit-1935;" "Mobile Radio Unit-1936;" "Emergency Radio Unit-1937;" "Emergency Radio Unit-1938;" "Emergency Radio-1939;" "Emergency Fire Radio Unit-1940;" and "Emergency Fire Radio Unit-1941," all Gaylord A. Knight Collection. By 1950 the group was known as the "Regional Office Radio Squad."

43. Apgar, interview with author.

44. Organizational acculturation may be considered synonymous with the more familiar characteristic of fraternalization. See Kaufman, "Developing the Will and Capacity to Conform," *The Forest Ranger*, pp. 161-200.

45. Apgar, interview with author.

46. Evan W. Kelley, "Memorandum for Chief, Forest Service," 11 March 1936, Gaylord A. Knight Collection, pp. 2-5.

47. Apgar, interview with author. The offer was made by an estate attorney who hoped the sale would spark real estate sales in the neighborhood. It is interesting to note that in 1978 housing surrounded the site and stretched across the valley. In 1971 the location was donated to the city of Missoula.

48. Apgar, interview with author.

49. Apgar, interview with author.

50. W. B. Apgar, "Memorandum for Files," 28 March 1938, Gaylord A. Knight Collection.

51. L. C. Stockdale to Forest Supervisors, 14 April 1934, Gaylord A. Knight Collection.

52. Clarence C. Strong to Forest Supervisors, 2 May 1935, Gaylord A. Knight Collection.

53. These plans are maintained in the Regional Office, Missoula, and were in the possession of the author at the time of writing this chapter. See Gaylord A. Knight Collection.

54. See, for example, W. B. Apgar, "Communication Plans-Lewis and Clark National Forest," 12 March 1937, Gaylord A. Knight Collection.

55. C. P. Fickes to Forest Supervisors, 10 April 1936, Gaylord A. Knight Collection. See page 306.

56. Ray R. Fitting to Regional Forester, 29 April 1936, Gaylord A. Knight Collection.

57. F. E. Thieme to Forest Supervisor, 18 April 1936, Gaylord A. Knight Collection.

58. Apgar to Thieme.

59. Fitting to Regional Forester, 14 April 1936.

60. Fitting to Regional Forester, 29 April 1936.

61. Dave Brown, interview with the author in St. Maries, Idaho, May 1979.

62. Apgar, interview with author.

63. J. H. "Bud" Coats, "Communications in the National Forests of Region One," *ca.* 1979, unpublished draft, Gaylord A. Knight Collection.

64. Apgar, interview with author, and Brown, interview with author.