times. The reason, he argued, was that while there were more jobs to be done after the earthquake, they were not scheduled; thus, there was much time spent in simply standing by. "We were there if they needed us," he said, "but later on we returned to assigned day-work."

### Treatment Plant Section

Members of two sections of the water division normally engage in maintenance tasks. The treatment plant section personnel are responsible for the operation of the plant itself (the electronic equipment is maintained and repaired by a representative of the company which provides it) and for the operation and maintenance of the seven deep wells which supplement the Ship Creek surface-water supply. Members of the maintenance section of the water division are charged with the maintenance of the distributive system, although they also perform certain small construction jobs from time to time.

Any interruption in water service is considered by members of the division to be an emergency. These interruptions, however, are also considered "normal," caused most frequently by power failures and breaks in the distributive system. A consequence of such "normal emergencies" is the virtually automatic response of experienced employees to these recurrent crises.

Thus, many of the personnel indicated that the tasks they performed following the earthquake were the "normal" activities which any emergency would provoke. This was especially true of the members of the treatment plant section, most of whom are experienced "old-timers." They were so familiar with the system -- the operation of the plant and the deep wells -- that the shift from Time One tasks to emergency operations was accomplished relatively easily. On duty at the time of the earthquake, one member of the section described his activities in terms of any emergency resulting from the loss of electric power.

> I would say that a lot of the emergencies we have are closely associated with this one as far as what happened in the plant: the power going off and the valves closing. This could happen any time -- it could happen right now. And you'd see /us/ take out of here and start going on manual and getting the light plant going /for emergency power/. What happened during the earthquake -- except for loss of the boilers and everything getting knocked out and the pipes broken -- it happens a lot of times when the power goes off. You've got to go through the same actions. . . . When the juice goes off, this plant closes down all the valves, and you've just got to open them and naturally get the chlorine in there as fast as you can. I would say that's the way it would be. If it happened tomorrow, it'd be the same thing.

Similarly, an operator responsible for the deep wells said that "all the men stepped into a normal thing: they knew what had to be done and they just went and done it." The basic difference between Time One and Time Two, he added, was that during the emergency there was much more work.

During the three-day emergency period (and for several days afterward), the plant foreman -- who lives at the site -- worked alternate twelve-hour shifts with his assistant. They worked alone in managing the plant and coordinating its flow of water with the repairs being made on the distributive system, but did receive a number of visits from persons outside their section. With one exception, however, these visitors did not directly assist treatment plant personnel but inspected the plant or performed tasks totally outside the work of the plant foreman and his men. Friday evening the manager and the general foreman of the water division spent time at the treatment plant. For two hours, together with the plant foreman, they worked to provide the plant with emergency power and restore radio communications with the downtown office. The principal motive for their visit, however, was to assess plant damage and determine its requirements for normal operations. On Saturday a representative from the company providing the plant's electronic equipment began the repair of the automatic system. This, clearly, was a task the plant foreman and his assistant were not prepared to perform themselves. Again, on Sunday, a maintenance crew was dispatched to the treatment plant to reinforce the roof, which had been weakened by the tremors and was in some danger of collapsing. The most important outside person at the plant was from the state (and Anchorage) health department, assigned to make emergency chlorine tests. Normal tests are taken by treatment plant personnel under the supervision of the health department, but during the emergency a higher chlorine content was ordered because of the danger of sewer contamination. Under these circumstances, the health department took over the tests directly. This was the only instance of clear change in normal tasks within the section. All other emergency operations of the plant were left entirely to the foreman and his assistant.

Because communication with other water division personnel, especially those engaged in emergency repairs to the distributive system, was vital if water services were to be efficiently restored, an additional member of the treatment plant section reported to work on Saturday to operate the radio. This extra man allowed the foreman and his assistant, who had also reported for work on Saturday, to continue the operation of the plant. Split shifts between the foreman and his assistant began at this time.

Other members of the section were similarly left to themselves in making emergency repairs. The man responsible for the maintenance of the deep wells, for example, worked alone during the two days following the earthquake. Of the seven pumps, four were undamaged and required only an adequate power supply to be returned to operation. The other three pumps, however, were damaged and not until Sunday noon were these wells back in service. During the emergency period, the power supply was erratic and, because most of the wells are manually controlled, this man had to restart the pumps whenever power was lost even for a short period of time. Thus, he was busy

moving from one to another of these wells throughout the emergency, despite the fact that by Sunday all seven of the wells were operative.

### Water Maintenance Section

The maintenance crews of the water division were faced with a number of separate problems which, together, demanded a major effort at restoration of services. The earthquake had produced a great many breaks in the distributive system, in areas of land movement as well as in areas not so obviously affected by the disaster. In addition, the loss of power to the deep-well pumps precluded the immediate use of this source of supply for those portions of the system still intact. More breaks in the system resulted from the freezing of water left standing in the mains. Happily, the pipeline from Ship Creek to the treatment plant, although cracked by the earthquake, continued to supply water into the system; as soon as manual operation of the plant was possible, water in certain sections could be kept moving, preventing further breakage due to freezing.

The principal tasks of the maintenance crews, then, were to locate the existing breaks in the system, to close off those sections, and to allow the water into the undamaged parts of the system. Four hours after the earthquake -- despite the fact that the entire system had been drained -- water service was restored to much of the eastern portion of the city, residential areas least affected by the disaster. The valving operation continued throughout the emergency period, so that by Sunday, service was provided for almost all residential sections of Anchorage, except for those, like Turnagain, which had suffered the direct effects of violent ground dislocations. The surface water supply from Ship Creek had been interrupted on Saturday by landslides above the plant, but by that time power had been restored to four of the deep wells and they provided water to the operational parts of the system during the interruption.

To restore water service for the heavily damaged downtown and Turnagain areas, temporary installation of irrigation pipe was necessary. This work began, especially in downtown Anchorage (at the request of the mayor), on Monday at the end of the emergency period. The materials required for these temporary connections were ordered from Seattle on Monday; they began to arrive in Anchorage the following day. The actual construction therefore, did not begin until after the emergency period. The work of the immediate post-disaster period was to operate the undamaged system wherever possible not to repair the damages. One of the foremen described the tasks of the first week following the earthquake, "We couldn't do much repair the first week: we were just trying to get water where we could."

To this extent the tasks of the emergency period differed very little from those of normal times. Only infrequently are the maintenance crews called upon to make installations and connections in the system; rather their normal responsibilities are to continue the operation of the existing system. The emergency period, according to one of the maintenance foremen,

> /was/ no different than a normal day except that it was longer hours; possibly we worked a lot harder, but we had more or less the same activities that we had prior to the earthquake, except that there were more valves to check, more areas to check out, more repairs. But outside of a little more speed, it was just routine.

The men on the crews, he continued, "Knew what they were doing, except they had a lot more to do." Because the effects of a break in the system were well known to the maintenance men and because such breaks were not uncommon, there was apparently little difficulty in meeting the demands of the disaster. "We've been through the same thing many, many times. . . . It was just bigger and lasted longer and everybody worked a lot harder /than before/." The same foreman summarized his own reactions to the situation by flatly suggesting, "I still don't think there was an emergency."

This reaction to the disaster was common among the "old-timers" of the water division. But for the manager and for other "new" members of the division, the effects of the earthquake were somewhat less easily dealt with. One maintenance worker, for example, compared his emergency tasks with those of more experienced members of the division and concluded that he had considerably more difficulty.

> When our breaks showed up, we just had to run from one to the next. I never did any paper work; I was in the field all the time, running from one place to the next trying to find the valves and to help them shut it off or turn it on. It was pretty hectic there for myself being unfamiliar with quite a bit of the system. Some of the old parts of town, although you have maps and stuff, maybe they wouldn't show /the location of valves./ I mean there's some downtown areas /where it is/ just impossible without being there before to remember these things. And that's what made it a little bit harder for me than for /the others/.

The result was that he spent most of his time during the emergency period working with the "old-timers."

Similarly, the manager of the water division was in the field with the foremen of the maintenance crews during the post-disaster period. He was new to his position and to the Anchorage water system, and thus relied on the knowledge of the members of his crews to a greater extent than might otherwise have been the case. A respondent said:

> He came into the office once in awhile just to see how the office crew was working, but other than that was in the field assisting the foremen in coordinating their work -- rather than them assisting /him/.

Highest priority in the water division during the emergency period was on maintaining public services, i.e., maintaining a supply of water to as many residents of Anchorage as possible. This task, just as the opening of fire lanes in the city, was dictated by the need for fire protection, water and sufficient water pressure in the event of double disaster. The emphasis of immediate emergency tasks was, then, on restoring service to the great relatively undamaged sections of Anchorage and, only after this had been largely accomplished, turning attention to the more severely damaged parts of the city which required reconstruction as well as restoration. In every maintenance section of the public works -- in the street and sewer crews as well as the treatment plant and water crews -- the highest emergency priority was placed on maintaining vital services: first, by reducing the potential for additional losses of public facilities and added dangers and discomforts to the public and, second, by restoring service to those parts of the street, sewer, and water systems which remained physically intact.

Unlike many members of the engineering sections whose normal tasks were necessary only when reconstruction began, and unlike certain personnel in the services sections whose Time One activities were almost totally irrelevant in Time Two, members of the maintenance sections found their tasks during the emergency period virtually unchanged from those of normal times. The maintenance priorities which had applied during Time One applied with even greater relevance to the disaster.

## Services and Administration

The principal functions of the Anchorage Public Works are engineering and maintenance. The importance of these functions is reflected in the two major divisions of the department and the tasks of these divisions. But, in addition to these functions, there are certain public works "service" functions provided, on the one hand for the public and, on the other for the department itself. Of the first type, the sanitation section of the maintenance division is a clear example. Certain office jobs, like those of the clerk-typists and the administrative assistant, may be seen as examples of the second type of service. During Time Two, when maintenance became the principal function of the public works, this second type of service task was almost completely discontinued. This was particularly true of the customer service section of the water division and of office personnel like the administrative assistant and various clerks and typists of the organization. The suspended functions of the customer service section, for example, were record keeping and billing for the water division. Similarly, the administrative assistant and secretaries whose Time One tasks were discontinued performed services for the organization, not for the public.

Members of the sanitation section, however, normally perform the first type of service task. Their function is as vital to the safety of the public as the functions of the police and fire departments. During Time Two the function of this section was not suspended; rather, its activities were broadened, largely because of the disruptions in the city's sewer system.

Administrators, like the director and assistant director of public works, perform tasks which are defined by their authority positions in the department but, as was noted in chapter three, they tend to take either engineering or maintenance orientations in the exercise of their authority. During the emergency period their tasks remained administrative although their power of decision making was shared with a large number of other persons in the organization.

Some discussion and comparison of the emergency activities of members of the customer service and sanitation sections are presented here. The Time Two tasks of the administrative assistant and other office personnel are also described. But because the exercise of official authority is the principal task of administrators, a more detailed consideration of their activities is reserved for the discussion of authority and decision making in the next chapter.

## Customer Service Section

Of the three sections of the water division, members of the customer service section assumed more added tasks than any other water employees. Members of the customer service section, unlike treatment plant and maintenance personnel, were called upon to perform totally different tasks during Time Two. One respondent said:

> I'm thinking here of a customer service man who had only been working for us approximately two weeks when he suddenly found himself in charge of warehousing all the emergency gear that was being flown in, plus, I would guess, in charge of probably half a dozen laborers working under him.
>
> We had our customer service people /he continued/ out with five of the company's big boilers and they were thawing the service lines. That was another area of work that was covered by the customer service people rather than the maintenance people during the emergency period.

Employees in the section, according to another member of the water division, were almost completely unprepared for these new tasks. The man in charge of the warehouse, for example, "had never even seen a /pipe/ fitting before and he had to keep a running inventory on everything." Similarly, the men in charge of the thawing machines had never seen a thawer before. The office clerk was on the radio during the emergency period and she, too, had had no previous experience to prepare her for this task.

The supervisor of customer services was himself new to the water division. He found during the emergency period that he, like those under him, was called upon to engage in activities which were completely outside the range of his normal tasks. He received, as one respondent put it, "three years' experience in three days" -- a statement which nicely captures the

radical change in his tasks. Normally his is an office position, but during the emergency he was variously occupied at the water system filtration plant and in emergency radio communications at the City Hall. "You just did what you saw to do," summarizes the variety of his activities as well as of other members of his section.

### Sanitation Section

Members of the customer service section performed emergency tasks which were totally different from their normal activities, while the tasks of members of the sanitation section were broadened to include new but related responsibilities. Following the earthquake, the normal activities of the sanitation section were neither required nor possible in the disaster situation, but by Monday trash pickup as well as regular collection of waste from areas of the city without sewage service was begun. Thus, during much of the emergency period itself, the personnel of the sanitation section were engaged in tasks which were of more immediate concern: Friday night for example, the head of the section, the sanitation officer, and at least one of the drivers (plus certain individuals from outside public works) aided in restoring essential power services to a local hospital. On Saturday, members of the sanitation section helped the general maintenance section prepare water trucks should the fire department have need of them. On the same day three members of the sanitation section reported that they worked with other general maintenance crews inspecting the sewer system for earthquake damage. And the head of the sanitation section spent much of Sunday acting as public works dispatcher, relieving the general maintenance sewer foreman of the task while the latter coordinated the inspection and restoration of sewer service.

Inspection of the sewer system revealed the necessity of providing emergency sanitary service to hard-hit residential areas like Turnagain. To this end, on Saturday afternoon the head of the sanitation section organized the effort to free the city garbage trucks from the storage shed which had collapsed on them during the earthquake. At the same time, oil drums, similar containers, and chemical toilets were gathered. By the end of the emergency period on Monday, collection of human waste had been initiated by sanitation personnel, in addition to the resumption of their regular collection of the now great accumulation of emergency trash and debris.

The end of the emergency, then, coincided with an expanded but relatively regular work load for members of the sanitation section, a development which had also characterized the operations of the equipment maintenance section. For both sections, the emergency period had been marked by a "hurry-up-and-wait" pattern of tasks. One member of the sanitation section said:

> There was a lot of time through those first couple of days that you would just be here at the shop on standby. I mean you weren't working continuously. You may spend an hour or two hours at a location of standby. . . . There'd probably be four, five or six men waiting for a job. As /the section head/ received a call for a job, he'd have these men at his disposal.

One characteristic which can be used to set off both the customer service section of the water division and the sanitation section from the other engineering or maintenance units of the public works is the regular schedule under which these service personnel normally work. Particularly in the sanitation section, this schedule of tasks, once described, remains relatively constant from one time to another. Representatives of the customer service section likewise operate by schedule. The emergency period radically disrupted the schedules of both sections. Members of the sanitation section had rescheduled their somewhat expanded tasks by the end of the emergency period; however, because the normal activities of customer service representatives were impossible until the water system was completely restored, it was sometime later before a similar regularity could be reestablished in that section. In the interim, the personnel were employed in tasks which often were completely new to them. The unstructured interim was considerably shorter for members of the sanitation section but they, too, were involved in new tasks: the head of the section for example, helped the health department with the testing of city water; one of the men in the section supervised a temporary warehouse for sanitation supplies at the airport; and several employees found themselves operating heavy equipment, like boilers, for which they had no experience.

## Office Services

For public works personnel who normally do office work, like the administrative assistant and the several secretaries and clerk-typists of the organization, the disaster altered their tasks completely. Normal tasks were suspended altogether and office personnel filled in wherever they were needed. The emergency period, according to one respondent,

> was entirely different. I mean, it was all just emergency work, trying to get the town settled, the emergency taken care of. Anything that could be let go -- I mean, routine work -- we just didn't do. We just did what we had to do and later did the other.

A secretary summarized her impressions of the emergency in the same way: "As far as routine office work was concerned," she said, "we just forgot all about that; we just helped wherever we could."

Office help could do little during the immediate hours after the earthquake. Neither the administrative assistant nor the secretary of the director of public works reported to work until Sunday. At that time the administrative assistant took over the hiring of additional personnel; the secretary worked in the city assessor's office with other clerical help who were tabulating the cost of the earthquake to public and private structures. For both, these were tasks completely outside their normal responsibilities.

The administrative assistant, however, was not entirely unprepared for his new tasks. He knew something of the paper work associated with hiring persons and during Time Two hiring was greatly simplified. It was reported

> We didn't try to get any physical exam or finger print or anything. The application was completed and that was it. The new men weren't really on the payroll, they were paid separate checks. Those people who just worked one or two days or half a day, we just sent the time over to /the payroll clerk/ and he'd write checks for them. It was more or less like we were buying some products -- it wasn't a normal payroll deal.

Only several days after the emergency period, when demand for additional personnel had declined somewhat and specific requests could be made (e.g., "We need six laborers and two truck drivers"), were normal procedures for hiring re-established. Even then there were problems.

> Some of the men, I think, went to work and never did get paid. Maybe they didn't intend to get paid. Some of them never did turn in any time sheet. They were told when we hired them, "Be sure to make up the date and how many hours you worked that day." And if they didn't do it, they came and asked for their checks, we'd find out they didn't fill out a time sheet, we'd just have to make it out then and then pay them. Some of them just never came back.

The biggest problem, one respondent concluded, "was just keeping track of them."

However, one problem associated often with hiring extra personnel, particularly during the summer, was avoided after the earthquake. That was the problem of "drifters." According to the public works administrators, the majority of persons who were added to the payroll during the emergency period -- despite the unorthodox manner of hiring -- were local and very dependable. The greatest number of summer workers (somewhat less dependable apparently) had not arrived at the time of the disaster. An administrator said:

> We were taking most everyone, anyone we could get . . . but we didn't screen them very well. Normally, I find it best to screen a person well before you hire him, but during the quake we didn't have time and the men were local so there wasn't too much to be frightened of because there wasn't this influx of drifters. It was still winter time; spring hadn't broken and the construction shift wasn't here, so we had local people to contend with and you don't have too much trouble with them.

## Administration

Unlike other administrative personnel, the administrative assistant remained at the department offices throughout the emergency period. Both the director and the public works superintendent spent considerable time in the field with the inspection and maintenance crews. Their assistants -- the assistant director and the assistant superintendent -- served in the field and as communications and procurement officers at the Public Safety Building.

During the emergency period, the director and the superintendent of public works made frequent inspection tours of the most heavily damaged areas of the city. Saturday morning, for example, the two of them made a first-hand inspection of the 4th Street slide. The superintendent also supervised the gravel-haul operations. The director was "in and out" of the Public Safety Building throughout the weekend making personal inspections of damaged areas and emergency repairs. The superintendent continued at the Public Safety Building -- which had by then emerged as "disaster headquarters"; his assistant operated from the public works shop where the maintenance crews were assembled and dispatched.

The procurement of supplies fell to the assistant director, a task which involved considerable radio communications. He emerged as a liaison between public works, civil defense, and the military, because these two latter organizations obtained much of the public works' emergency supplies. A more detailed description of the relations among these organizations will be presented in chapter five of this monograph.

## Conclusions

Although Anchorage had never suffered a disaster of the scope of the March 27 earthquake, and although public works had no disaster plan, those sections of the organization which were normally responsible for the maintenance of public systems -- streets, sewers, and water -- were generally well-prepared to meet the emergency. Personnel of these sections had considerable experience in meeting smaller, less diffuse crises: a break in the water or sewer system, a power failure and loss of service to the treatment plant, and the like. For these personnel, the earthquake produced a situation which differed in degree rather than kind from what has been called "normal times." A public works official probably had this idea in mind when he observed that, "sewers are sewers whether they are broken because they are stopped up from /earthquake/ debris -- they are still sewers and they have to be unstopped." And almost every member of these maintenance sections, during their interviews, somewhere observed essentially the same continuity: "We knew what had to be done, and we did it." Task priorities, then, for maintenance personnel remained constant. Consequently, tasks they engaged in during the emergency period were essentially the same as their normal tasks.

As will be suggested in the following chapter, the most important change in Time Two behavior for maintenance personnel was generated by the scope of the emergency. The earthquake resulted in damage so widespread that too few

persons were employed in the maintenance sections to cope adequately with it. But additional personnel required changes in the authority structure of the organization, and, at the same time, the imperative for quick restoration of essential services required change in patterns of decision making. In this respect the earthquake may be said to have been an emergency for maintenance personnel: it demanded the performance of a great number of familiar tasks in a situation which also demanded increased speed.

For engineering personnel, the earthquake was a "disaster." Their normal tasks were irrelevant to the changed environment, so irrelevant that for many there was nothing to do. For others new tasks were assumed: "We saw what had to be done, and we did it." The end of the emergency -- better, the end of the disaster -- for these persons was marked by their return to their normal tasks or, for some, simply by their return to work.

If the maintenance personnel found that an extension in authority was necessary to coordinate the operations of a greatly expanded work force, personnel in engineering quickly discovered that their authority problems were more difficult, even though they had not added any new persons. In taking on new responsibilities, the engineers had so altered their normal behavior that, for example, their authority relationships were reversed. Thus, chapter five will be devoted to a discussion of changes in authority and decision making in the engineering and in the maintenance sections of the public works.

Those engineering personnel who were most actively involved in the tasks of the emergency period were supervisors. Probably their emergency activities were largely consequences of their being supervisors: even though their normal tasks were irrelevant, as supervisors they felt that they should involve themselves. Similarly, public works administrators were active during the disaster period, less in the sense of doing things as in the sense of organizing those who were. From this point of view, their tasks did not vary from Time One to Time Two. This is consistent with the frequent observation that persons occupying the higher positions in an organization find it difficult to give specific descriptions of their tasks. Their tasks, in effect, are whatever they do. Chapter five includes a discussion of the authority tasks of public works administrators -- a description of what they did, their authority and decisions during the emergency.

FOOTNOTES: Chapter IV

1. For a discussion of the conditions which generate search and rescue activities, see Russell R. Dynes, Organized Behavior in Disaster: Analysis and Conceptualization, Disaster Research Center Monograph Series (Columbus: Disaster Research Center, The Ohio State University, 1969).

2. The local civil defense director had resigned his position several weeks before the earthquake. Thus, there was no formal, local official of that organization available to coordinate the immediate post-impact activities. On his own initiative the resigned director began to work soon after the earthquake and was informally rehired in the middle of the night.

3. J. A. Fife and C. E. Cannon, "How Anchorage, Alaska Restored its Water and Sewerage System after the Earthquake of 1964," Water and Sewage Works (April 1965): 122.