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# Soviet Civil Defense Medical Services

A Special Intelligence Assessment

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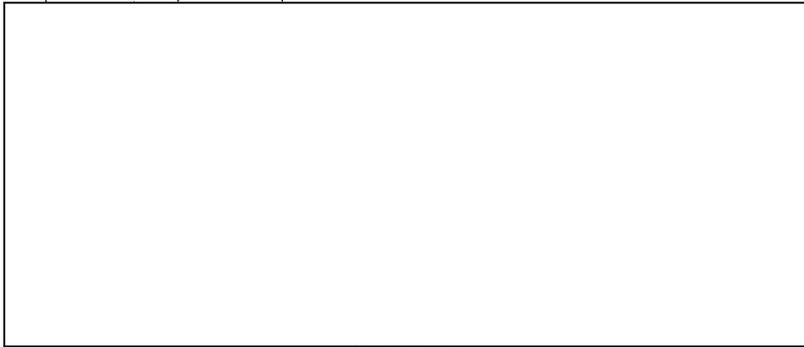
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## Soviet Civil Defense Medical Services

*Central Intelligence Agency  
National Foreign Assessment Center*

*April 1978*

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### *Key Judgments*

- The Soviets appear to have a comprehensive and elaborate plan for mobilizing all civilian medical assets in time of war or natural disaster under the Civil Defense Medical Service. The plan includes provisions for the orderly transfer of medical personnel from threatened urban medical facilities to organized groups of medical facilities previously established outside the cities.
- While no system of medical services is capable of fully coping with the effects of a massive nuclear attack, the USSR probably could provide a significant measure of medical assistance to casualties if it received sufficient warning time—on the order of several days.
- Despite the comprehensiveness of the medical plan, in the event of a general nuclear attack, Soviet medical services could not prevent high death rates among the seriously wounded and would allow only relatively low rates of return to duty.
- Because of the size and scope of the civil defense medical plan, full implementation probably is beyond present Soviet capabilities.

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## SOVIET CIVIL DEFENSE MEDICAL SERVICES

### SUMMARY

The Soviet Civil Defense Medical Service has developed an elaborate two-stage plan for using all the assets of the Ministry of Health to evacuate and treat casualties in the event of war or national disaster. In the first stage, mobile first aid detachments—consisting of physicians and paramedical workers from city and local (rayon) health services—and first aid teams from factories and other installations are to be deployed from their shelters to the edge of the “zone of light destruction.” The detachments and their subordinate medical teams are to perform emergency life-saving services, decontaminate persons exposed to nuclear materials, provide temporary hospitalization, and evacuate casualties to the hospital base area.

While plans for the operation of the detachments appear adequate, the size and composition of units could vary significantly in different areas of the USSR depending upon the availability of local assets; in case of war some physicians now assigned to the detachments might be drafted into the military and thus would not be available for civil defense duties. The Soviets estimate that at least 50 percent of all casualties will require specialized hospitalization and that an average handling and transit time of about three to four days will be required for casualties to reach such facilities. We estimate that between 7 and 14 percent of these casualties can be expected to die because of the delay in receiving definitive medical treatment.

The second stage of the plan consists of providing specialized medical care at hospital bases outside the cities to casualties from the “focus of destruction.” The hospital bases are a combination of expanded existing medical facilities, converted buildings, and/or mobile tent hospitals of up to 300 beds. According to the Soviets, they may be “tens or even hundreds” of kilometers away from the urban target areas they serve, but in no case should they be more than 10 to 12 hours away. Each hospital base manages two or more collection points, and each collection point is to manage eight types of specialized hospitals, most of

which will have to be created entirely from local medical assets.

The main hospital of each collection point is essentially a general hospital with additional assets for nuclear decontamination and burn and shock treatment. In the event of mass casualties, the main hospitals are in the greatest danger of sudden overloading because most casualties will be sent there first before being assigned to an appropriate specialty hospital.

The comprehensive organization of the hospital base is well thought out but is beyond the present capability of the Soviets to implement fully. The acquisition and marshaling of highly trained manpower, specialized equipment, and essential drugs in the amounts required to create large numbers of eight-hospital complexes would place a severe burden on the Soviet economy. The problem of what to do with existing hospital patients also is larger than the Soviets appear to anticipate. At present, the Soviets seem to indicate that those patients that can be sent home will be discharged; that those who cannot be moved will be sent “elsewhere.” There are no hard indications of where “elsewhere” would be.

Another important problem involves the number and quality of medical personnel. The Soviet medical establishment in 1975 was estimated to contain about 800,000 physicians (possibly including those in the military) for a physician-to-population ratio of about one to 320. In addition, there are about 500,000 feldshers (doctor's assistants), 1.2 million nurses, and 600,000 other medical workers capable of rendering first aid and other treatment during an emergency. These personnel, all of whom are probably trained to some degree in civil defense medical operations, staff at least 25,000 hospital units with at least 3 million beds.

If all categories of medical workers are combined, the system contains an estimated one medical worker

for every 82 persons. This figure is impressive but it must be placed in perspective. The first aid training received by low-level medical workers and members of factory civil defense formations is rudimentary and, in any case, is limited in value because it is only the initial step in the treatment process for moderate to severe injuries. At the level of nurses and feldshers, medical training for civil defense is more advanced and includes selected aspects of trauma management as well as some practical training. At the physician level, however, except for specialists, in-service advanced training in the management of severe trauma often consists of only a few hours of lectures and includes little advanced clinical cross-training. The average narrowly trained Soviet physician is in a poor position to function effectively as, for example, a surgeon. Because surgery is the primary medical skill required in emergency treatment of blast injuries, and the specialized hospitals require large numbers of other specialists, the main burden for providing definitive medical care rests on existing surgeons and other medical specialists, who are in chronic short supply. This limits the Soviet ability to render definitive treatment to mass casualties. To date there is no indication that the Soviets have begun a comprehensive physician training program in disaster medicine sufficient to relieve this limitation. This situation could seriously reduce the Soviet ability to return casualties to full productivity.

Overall figures for medical manpower and hospital beds are available, but the lack of a breakdown of physicians by medical speciality makes it difficult to determine how many physicians in the critical specialties are available and thus make a reasonable estimate of the number of casualties that might be expected to receive definitive treatment in the specialized hospitals. The only available data that

address the capacity of at least a portion of the Soviet medical establishment to function in a mass casualty situation concerns the results of Soviet training exercises undertaken several years ago that involved tactical nuclear strikes in frontal-sized areas. In these exercises, all medical facilities in the strike zones would have become saturated within a few days, and after about two weeks the accumulation of untreated casualties would have reached well over one million. The Soviets, therefore, must be aware of at least some of the deficiencies of their medical establishment in coping with a nuclear strike. At present we cannot make an accurate estimate of the maximum number of casualties that the Soviets could adequately treat following a general nuclear attack.

Medical support must be provided in dispersal and evacuation areas. For the most part, the personnel, supplies, and facilities for this service would be in addition to those serving the two stages of medical evacuation, but there is no hard information on how many medical assets would or could be committed to this effort. Outbreaks of infectious disease, possibly facilitated by radiation-induced suppression of the immune response, would pose a significant health problem, particularly among children. In the past the Soviets have had difficulty containing extensive outbreaks of infectious disease, such as the cholera epidemic in the Black Sea area in 1970. The Soviet peacetime capability to contain infectious diseases would degenerate rapidly following a general nuclear attack.

Although the USSR almost certainly has extensive stockpiles of medical materials, their location and the amount and kinds of material stored are not known. To date, only one medical supply depot for civil defense has been identified and located.

## DISCUSSION

### ORGANIZATION AND FUNCTION OF THE CIVIL DEFENSE MEDICAL SERVICE

The USSR appears to have a comprehensive and elaborate plan for the mobilization of all medical personnel, facilities, equipment, and supplies in the event of war or natural disaster. In the event of war, medical support plans apparently assume an attack on the USSR with large numbers of nuclear weapons of moderate yield, followed by chemical and possibly biological weapons where appropriate. Civilian medi-

cal assets are to be mobilized under a national organization referred to as the Civil Defense (GO) Medical Service which is one of several services under the Defense Ministry's Main Administration of Civil Defense (GUGO).

#### Ministerial Level

The Ministry of Defense is the central authority for managing military and civilian medical assets for civil defense.<sup>1</sup>

Military medical assets (for troop health) are controlled by the Central Military Medical Directorate (CMMD) under the Rear Services Directorate. Organizations subordinate to CMMD include: the Medical Service, which directs a Military Medical Directorate in each of the 16 Military Districts; a Military Medical Academy; Military medical research institutes; a chief epidemiologist; a Central Military Medical Commission; and a Scientific Medical Council.<sup>2</sup> While the primary mission of the military medical service is troop health, military medical units that may be operating in a disaster area are believed to accept some civilian casualties if local medical facilities are absent or inadequate.<sup>3</sup> In addition, the first aid units of the military Civil Defense Regiments also appear to accept some civilian casualties as a part of their mission.<sup>4</sup>

Civilian medical assets appear to be controlled in wartime by GUGO which has a headquarters in each military district, union republic, oblast, rayon, and city.<sup>5</sup> The GUGO headquarters at each of these administrative levels is said to have a staff organization that includes a medical service function among its other civil defense services. The organization called the GO Medical Service probably is managed by the GUGO staffs mentioned above.<sup>6</sup>

The GO Medical Service of GUGO is believed to exercise operational control in wartime over the Medical assets of the Ministry of Health, the Ministry of Medical Industry, and the DOSAAF\*/RCRCS\*\* organizations at all administrative levels. In peacetime, the GO Medical Service mission seems to be the formation of doctrine and the planning and coordination of exercises. The GO Medical Service probably also coordinates the wartime interface between military and civilian medical assets.

The Ministry of Health controls essentially all of the civilian medical services and facilities of the USSR in peacetime. This includes the sanitation and anti-epidemic operations of the extensive Sanitary Epidemiological Service network throughout the country. For civil defense purposes, the GO Medical Service is believed to exercise its control over Ministry of Health assets through a unit called Department I, which is represented at all Ministry of Health administrative levels from union republic down to rayon and city.<sup>6</sup> The GO Medical Service also appears to coordinate with the Ministry of Medical Industry to plan for an

\* Voluntary organization for cooperation with the Army, Air Force and Navy.

\*\* Red Cross/Red Crescent Societies.

adequate stockpile of drugs and medical equipment for civil defense use, but the exact organizational link is not known. Figure 1 summarizes the general organization of medical assets for civil defense.

### Field Organization

The GO Medical Service, using all of the assets of the Ministry of Health, has developed an elaborate plan for medical evacuation and treatment in the event of an attack with weapons of mass destruction. The medical plan is based on a two-stage evacuation and treatment system in which the first stage consists of first aid and emergency treatment in or near the focus of destruction, followed by evacuation to second stage specialized hospitals in a hospital base area outside the target zone. (Figure 2)<sup>7</sup>

### First Medical Evacuation Stage

Units of the first medical evacuation operate within the urban target zone following a mass destruction weapons attack. The Soviets divide urban target zones into four sub-zones as follows: total destruction (over 1 kg/cm<sup>2</sup> overpressure); severe destruction (1 to 0.3 kg/cm<sup>2</sup> overpressure); light destruction (0.3 to 0.1 kg/cm<sup>2</sup> overpressure); and possible destruction.<sup>8</sup>

GO Medical Service First Aid Detachments (OPM), organized from local public health and industrial enterprise assets, are deployed to the edge of the zone of light destruction. These are mobile units that employ 5-12 physicians and numbers of nurses and paramedical (feldsher) personnel. The OPM are to sort casualties, provide full emergency life saving services, decontaminate persons exposed to nuclear materials, provide limited hospitalization for the seriously wounded, evacuate moveable casualties to the hospital base area, and other services as required. An OPM is programmed to handle about 300 casualties per day.<sup>9</sup>

The OPMs deploy and direct the operation of medical teams (SD)<sup>10</sup> and smaller medical team detachments that are formed from industrial workers and members of Red Cross/Red Crescent Societies.<sup>3</sup> The SDs deploy to the severe destruction zone, receive casualties from GO rescue detachments, apply first aid in the light destruction zone, then transport the casualties to the OPM. One of the most important of the OPM functions is the preparation for each casualty of a medical card that is to contain information on the injuries sustained, the treatment received at the OPM, the treatment needed at the hospital base area, instructions for transportation, and other vital infor-

mation and instructions.<sup>3</sup> It is apparent that any mistakes made on the medical cards under the chaotic conditions that would exist at the OPM following an attack could adversely influence the whole course of a casualty's timely evacuation and definitive medical treatment.

Rescue and initial first aid and life saving treatment in the first medical evacuation stage may be further supported by military medical companies and platoons of regimental or battalion-sized combat arms units that may also be in the strike area.<sup>4</sup> The degree to which such units may handle civilian casualties, however, is not clearly stated. In particular, it is not clear whether civilian casualties would be sent to military rear area hospitals or to GO Medical Service controlled hospitals in the GO hospital base area.

### Strengths

- There is a detailed plan for the rescue, initial treatment, and sorting of casualties from urban strike zones.
- Appropriate medical units have been or are to be formed in peacetime from local medical assets.
- Medical units so formed are to receive regular classroom training and usually some practical training and drills.
- Medical supplies for initial unit supply loads are said to be stored in hospitals or state storage facilities where in theory, they are quickly accessible to the GO Medical Service units.
- Transportation and communications are to be furnished by the appropriate GO services (motor vehicle transport, and communications services).

### Weaknesses

- OPMs and subordinate teams would differ in size and personnel composition depending on what assets happen to be available in a particular urban area.
- Training of medical personnel for duty in an OPM often does not include a knowledge of the specific emergency plan which is nearly always classified.
- Most physicians in medical facilities from which OPMs and other medical formations are to be formed have military reserve commitments, and many presumably would not be available for GO services during war.

- Because of the uncertainty of physician availability an overdependence seems to be placed on nurses, often for medical services beyond their competence.

- The 3 to 4 days estimated by the Soviets to be required to sort and treat nuclear casualties and transport them to the hospital base probably would result in a 20-40 percent mortality rate among the seriously wounded.

- Many physicians who should receive special training in severe trauma management have not received such training or the training has been inadequate.

- It is doubtful that medical supplies will be readily available for civil defense either initially or in the post-strike period.

- The GO Medical Service will be in competition with all other GO services for limited motor transport and communications facilities, and in the present near absence of an air medical evacuation capability it is highly doubtful that numbers of OPMs operating at the 300 patients per day level will be able to maintain an adequate and continuous evacuation schedule to the hospital base area. Many of the above weaknesses could be at least partially corrected over the next decade but there is no indication that a corrective program of adequate intensity has been initiated.

It seems likely that the most effective medical units operating in urban strike areas will be military medical companies and platoons supported by mobile military field hospital facilities. The military physicians and paramedical personnel generally are better trained and equipped than are the civilians, and there is an increasing military interest in air medical evacuation. It could be that the military may be charged with the rescue and treatment of VIP and other key personnel casualties where possible.

### Second Medical Evacuation Stage

The second medical evacuation stage consists of delivering specialized medical care to casualties who have received emergency care in the focus of destruction. This stage is located in the extra-urban zone and consists of maximally expanded existing medical facilities, buildings that can be converted into hospitals, or mobile hospitals of up to 300 beds deployed in tents.<sup>10-12</sup> The combination of all such facilities managed by GO administrative staffs at oblast, or kray level is termed a hospital base (BB). The BB may be located "tens or even hundreds" of



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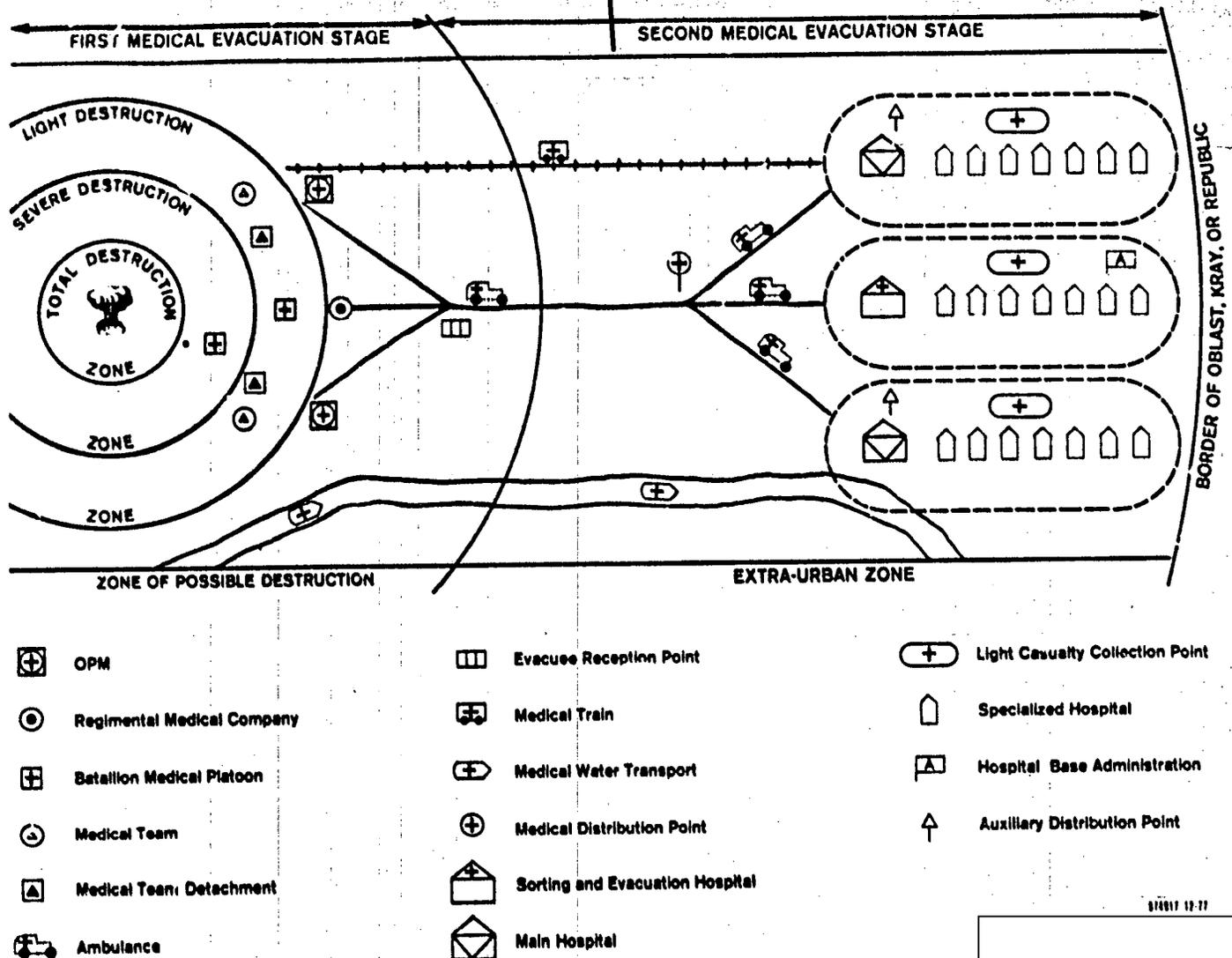


Figure 2. Soviet Medical Evacuation Plan

kilometers away from the urban target areas they serve, but in no case should they be more than 10-12 hours away. The Soviets estimate that not less than 50 percent of the casualties will require specialized medical care.<sup>9</sup>

Beds available within the BB are grouped into hospital collection points (BK). These are demarcated areas within which are located numbers of hospital facilities. Each BK contains a main hospital, hospitals associated with a light casualty collection point, and various hospitals that specialize in certain related categories of injury. BKs located nearest to target areas contain, in addition to the above, a special sorting and evacuation hospital.<sup>9</sup> All patients that can be discharged or transferred to their homes, to certain designated hospitals,<sup>10</sup> or to remote areas from hospitals committed for use by the BB are to be released upon an order from the GO Medical Service,

thus freeing as many beds as possible for expected casualties.<sup>11</sup> The dispersal of large numbers of ill persons to other facilities is expected to prove more difficult than the Soviets now appear to anticipate.

Under the control of the BB sorting and evacuation hospital, medical distribution points and evacuee reception points positioned along access routes to the BB receive and sort casualties from the destruction focus.<sup>3 10-12</sup> After sorting according to injury and verification of the information provided on medical cards prepared at the OPM, casualties are distributed among the BKs. An attempt is made to load all BKs concurrently so as not to overload some while leaving others unfilled.<sup>9</sup>

Within the BK, casualties are usually directed from the sorting and evacuation hospital to the main hospital, where the seriously wounded, including

combined injuries (radiation plus other injuries), and persons with contagious diseases are treated and hospitalized. The main hospital of each BK is essentially a general hospital with additional assets for nuclear decontamination and shock treatment. In the event of mass casualties, it is the main hospitals that are in the greatest danger of sudden overloading. The remaining patients are re-sorted and assigned to one of the specialized treatment hospitals on the basis of type of injury.<sup>3</sup>

The specialized hospitals\* are the principal therapeutic institutions of the BK, and their mission is to retain patients until recovery or death. The Soviets stress that the success of specialized hospitals depends on proper scientific and administrative management, competence of physicians in treating severe wounds, training and competence of secondary medical personnel upon which very heavy reliance is placed, and adequate and timely medical resupply.<sup>4</sup>

### Strengths

- The hospital base (BB) and hospital collecting points (BK) are well thought out and organized on paper for handling mass casualties.
- All existing facilities in the area are included and few new buildings would be required.
- Local (oblast, rayon) medical administrators and professional personnel are to be used to administrate and operate BB/BK facilities and thus would already be familiar with the facilities, area, and people.
- Medical supplies could be conveniently stockpiled in or near the BB facilities.
- The concept of trying to treat related categories of injuries in special hospitals is medically sound.

### Weaknesses

- BBs and their subordinate BKs will differ widely in the quality and quantity of medical assets that would be available for civil defense depending on the part of the country in which they are located.
- The orderly removal of patients from hospitals committed to the BB upon a war alert seems unlikely because very few facilities are known to be set aside to accommodate such patients.
- The conversion of large numbers of hospitals and clinics in each of many BK areas to eight different

\* See Annex I for a listing of and comments on the specialized hospitals.

types of specialized hospitals will require the marshaling and distribution of far more equipment, supplies, and personnel than we believe the Soviets capable of making available in the limited time between mobilization and the initiation of hostilities.

- Major bottlenecks beyond that already estimated at the OPM likely will develop at the sorting and evacuation points along the routes to the BB and at the main hospitals of the BKs.

- The main hospital in each BK will function like the newly developed Stationar hospitals (municipal trauma centers) and can be expected to suffer from the same shortcomings of poor diagnosis, lack of competent specialists, and poor coordination between departments.<sup>15</sup>

- Paperwork associated with the sorting, evacuation, diagnosis, and treatment phases appears excessive and confusing and probably will prove counter-productive.

- Despite the shortage of medical specialists, there is almost no evidence of advanced training of Soviet civilian physicians (most of whom are narrowly trained general practitioners) in the various surgery-related specialties required at the specialized hospitals.

- Burn hospitals, because of their great material requirements, probably will not all receive the necessary supply of specialized equipment required for treatment of large numbers of burn cases, and the return to duty rate is expected to be very low and expenses very high.

- Toxicotherapeutic hospitals, like burn hospitals, require far more specialized equipment for determinations of radioactive and other toxic materials than the Soviets are apt to be able to provide now or over the next few years.

- Despite specialized hospitals, combined injuries—particularly those complicated by significant degrees of radiation injury—are expected to experience high mortality and a very low percentage of return to duty.

- As was true in the first medical evacuation stage, timely transportation is expected to be limited and, therefore, a significant factor in increased mortality among the seriously wounded.

- There is clear indication that most of the hospitals of the BKs will be forced to place too much responsibility on nurses and other paramedical personnel.

## Medical Care at Dispersal and Evacuation Areas

Medical Care must be delivered to workers shifts dispersed to locations outside of target cities and to the remaining city population permanently evacuated to the countryside. The principal medical problems are expected to be injuries incurred during the movement to evacuation areas, infectious diseases, and radiation injury. Following such treatment as may be affordable to move-incurred injuries, the main activities must center around sanitation and epidemic monitoring and radiation monitoring. The sanitary-epidemiological aspect would be of special importance if use of biological weapons is suspected.

The GO Medical Service is to organize and deploy Medical points consisting usually of one physician or feldsher, a nurse, and medical orderlies, the exact size depending on the average number of persons per day seeking medical care. Facilities can be any shelter where two rooms—one for treatment and one for isolation—are available. Local elements of the Ministry of Public Health are asked to provide medical supplies for the Medical Points.<sup>3</sup>

This activity is vital in the weeks and months following a nuclear strike because all of the surviving population, both urban and rural, and particularly the children, will be in the evacuation areas. Major disease outbreaks, possibly facilitated by depressed immune responses due to radiation doses of 100-150 R, could result in substantial mortality since most of the available medical supplies probably will be committed to military use or to the BBs. The success or failure of this medical effort will depend primarily on the rapid identification of infectious diseases and prompt isolation of the sick, hopefully in infection hospitals of the nearest BK. The Sanitary-Epidemiological Stations would figure prominently in this effort. Another factor to be considered is how many physicians or paramedical personnel can be spared from civil defense and/or military medical facilities to monitor and care for persons in the evacuation areas.

Although the Soviets emphasize infectious disease prophylaxis, outbreaks of major infectious diseases occur frequently, and on most occasions early warning and attempted rapid anti-epidemic actions have proven inadequate.<sup>16</sup> Such inadequacies can be expected to worsen substantially following a nuclear attack.

## MAJOR MEDICAL PROBLEMS EXPECTED

### Surgical-Related Problems

Surgical personnel working in the zone of destruction and the extra-urban zone are expected to be seriously inadequate in number<sup>2</sup> and apparently will be backed up largely by non-surgeon physicians and nurse teams with some practical training in surgery. The few experienced surgeons apparently will be used largely in the specialized hospitals of the BKs in the extra-urban zone.<sup>3</sup>

Soviet medical articles on surgical care in the stages of medical evacuation emphasize the treatment of shock and discuss in detail surgical repair of a wide range of wounds. In general, the discussions describe Soviet and Western procedures and techniques of the 1940s and early 1950s, with occasional references to more up to date treatments. For example, in the treatment of traumatic shock emphasis is placed on the use of outmoded dextran-type blood volume expanders, saline solutions to which are added a variety of nutrients and other materials of questionable value, and even the substitution of diluted sea water for physiological saline solution in emergencies. In most cases, the use of whole blood in the treatment of shock is not mentioned except to indicate that transfusions are generally to be performed at specialized (blood collection) units.<sup>3</sup> Mortality can be expected to be higher with the use of outmoded methods and materials.

While discussions of surgical methods of wound resection often reflect practices and philosophies of the period of World War II and few discussions of civil defense surgical treatment reflect recent advances in trauma surgery,<sup>3</sup> this does not mean that most Soviet surgery will be entirely inappropriate under mass casualty conditions. For example, the Soviets have always favored the use of local anesthesia even in major surgery. While pain would be greater with local anesthesia, it permits surgery in cases that would have to be dangerously delayed if general anesthesia were contraindicated. Also, the use of preventive doses of antibiotics would reduce the danger of wound infection, thus making reasonable delay in surgery tolerable. On the other hand, while the Soviets manufacture and use many modern antibiotics, they continue to use early sulfa drugs such as sulfanilamide that exhibit relatively high toxicities. Also, the usefulness of Soviet antibiotic therapy and preventive treatment may be greatly offset by the very low doses recommended—lower than those used

by the US by a factor of  $10^3$  and the variable potency often found in Soviet antibiotics.<sup>17</sup>

Due to antiquated surgical practices plus certain questionable medical methods that are uniquely Soviet,<sup>17</sup> many surgeons in the USSR operating under mass casualty conditions probably would experience higher patient mortality and significantly lower return to duty rates than would be expected from US or most NATO surgeons. This shortcoming would be largely overshadowed, however, by the increased losses resulting from the performance of surgery by physicians with inadequate surgical training. Also, according to the Soviets, surgical resection of wounds probably could not be performed earlier than 3 or 4 days following rescue;<sup>18</sup> this alone could produce 20 to 40 percent mortality among the seriously wounded.<sup>3</sup>

### Radiation Sickness

The Soviets appear to consider the short and longer range effects of nuclear ionizing radiation to be the most dangerous consequence of a nuclear strike.<sup>19, 20</sup> In a general countryside nuclear attack, the short-range hazard would include prompt casualties from initial radiation and fallout casualties from local bursts and from bursts upwind. Fallout from upwind bursts may arrive after local fallout has abated to non-lethal or even safe levels and after people have vacated the shelters. Residual radiation from fallout would pose a longer-range hazard of weeks and even months duration.

Soviet literature on the treatment of radiation sickness appears quite complete and indicates that they have drawn heavily on Western research and experience in the development (on paper) of their wartime treatment plan. Blood supplies, laboratory facilities, and qualified medical personnel, however, probably cannot be made available in amounts sufficient to deal effectively with mass radiation casualties.<sup>21-23</sup> The Soviets realize that doses of ionizing radiation of 100-250 rads will produce acute first degree radiation syndrome and that 450 rads will prove lethal to 50 percent of the population so irradiated. A one-time exposure to 50 rads is given by the Soviets as the standard permissible dose beyond which some signs of radiation syndrome will appear that would require medical aid from the already heavily strained GO Medical Service.<sup>21</sup> Therefore, radiation protection rather than treatment probably will be emphasized. The Soviets indicate that persons having received over 400 rads are considered terminal and will receive only palliative treatment.<sup>3</sup>

### HEALTH PROBLEMS ASSOCIATED WITH SHELTERS

Recent reports suggest that Soviet civil defense shelter design became standardized during the 1973-75 period and that these shelters constitute most of the ones now being built.<sup>24</sup> Basement type shelters are preferred in which the shelter is essentially a separate structure from the building on top of it, heavily roofed and with 70 cm or so of sand or earth between the shelter and the first floor of the building on top. There is some indication that a number of older shelters are being brought up to the newer standards. Capacities of these standard shelters appear to be 50, 100, 150, 250, 400, 500, and there are plans for shelters 700 to 1,000 persons.<sup>24, 25</sup>

Data on these shelters that directly affect habitability are shown in Table 1.<sup>3, 24-27</sup>

Most of the standardized shelters now being built in target areas appear to be of the type employing air regeneration facilities, plus small amounts of outside air, and backed up by an unknown supply of compressed air in tanks.<sup>24</sup> This option allows for periods of complete hermetic sealing and for periods of temperature and humidity increase when supplemental air would be needed. Shelters that obtain all air from the outside would be more apt to be built in relatively open areas some kilometers removed from probable target zones so as to minimize the necessity for periodic hermetic sealing. Allowable periods of hermetic sealing without a back-up air supply are particularly sensitive to climatic conditions and overcrowding. Totally sealed shelters for VIPs appear to be relatively few in number and will not be considered here because very few details on their habitability factors are known.

Table 1  
Habitability Factors for a Standard Shelter

Factors	Soviet Specifications	
	Normal	Allowable
Space per person	1.5 m <sup>3</sup>	0.5 m <sup>3</sup>
Overpressure value (without safety factor)	2 kg/cm <sup>2</sup>	—
Protection factor	1,000	—
Volume of air per person per hour	2.5 m <sup>3</sup>	—
Oxygen content	21%	15%
Carbon dioxide content	1% max.	3% max.
Temperature maximums	23° C	30-32° C
Humidity maximums	70%	100%
Lavatory units per person	1 for 25	Variable, up to 1 for 75

The standard shelters can be judged generally adequate for habitability under the nuclear attack conditions apparently planned for. The alleged per person allowance of 1.5m<sup>2</sup> of living space would be quite adequate, but reports differ on this point and suggest a range of 0.5m<sup>2</sup> to 1.5m<sup>2</sup>. Shelter occupants could survive with between 0.5m<sup>2</sup> and 1m<sup>2</sup> of living space. An allowance of 2-5m<sup>3</sup> per hour per person of air is judged to be adequate under resting conditions. The air regeneration system mentioned (superoxide), supplemented with particle and toxic chemical filtered outside air plus an internal emergency air supply, should afford acceptable protection under most nuclear attack conditions. Shelters in target areas using filtered outside air as the sole source may have to be hermetically sealed in the event of a fire storm above that would burn off the outside oxygen. Such shelters usually can be sealed for several hours before carbon dioxide levels rise substantially over 3 percent, depending on packing factor and conditions of temperature and humidity.

Ventilation specifications tabulated above as allowable were stated by the Soviets to be adequate for sustained periods (presumably several days) without harming health or working ability. Actually, this judgment is overly optimistic at best. The temperature, humidity, and gas percentages would allow only for short periods of minimum exertion. Under such conditions, any overcrowding would be dangerous, and individual tendencies toward cardiac or respiratory disease or claustrophobia with resultant panic would be exacerbated.<sup>23</sup>

One aspect of the standardized shelter where some Soviet health authorities are reported to have voiced objections is in the septic tank venting system. Until corrected, this condition is said to make occupancy beyond 2 days dangerous.<sup>24</sup> We presume that gases, particularly methane, produced by the sewage constitute the principal health hazard referred to. The standard shelter also is reported to specify 1 toilet per 25 occupants.<sup>24</sup> This would be close to a minimum number of toilets and would present an increased danger of individual toilet failure or of complete inadequacy in the event of an outbreak of gastrointestinal disease. Such a situation could well produce toxic vapors that would force premature evacuation of the shelter at the worst, or in the case of shelters with no internal air options, require continuous venting of the inside air and its replacement with outside air regardless of external atmosphere conditions.

The requirements for resistance of standard shelters to overpressure and ionizing radiation penetration

have been reported as 28.4 psi (2 kg/cm<sup>2</sup>) and a protection factor (PF) of 1,000, respectively.<sup>25</sup> It is important to note that an overpressure not exceeding 28.4 psi assumes between 90 and 100 percent survival of the shelter and its occupants. The actual overpressure resistance (safety factor) built into the shelter may be anywhere from 2 to 4 times the 28.4 psi value. The PF of 1,000 probably would protect in most cases the average shelter occupant against radiation exposures over 50 rad. For example, in order for standard occupants to receive a 50 rad prompt radiation dose and an overpressure of 52 psi, the shelter would have to be only 0.8 mile from a 500 kt optimum height burst. A safety factor of as little as 2 x 28.4 psi would protect from the overpressure. As another example, fallout 9 miles downwind of a 500 kt ground burst would yield 50,000 rads over two weeks—still allowing only 50 rads of exposure inside of a shelter with a pf of 1,000.

Soviet standard shelters appear to be structurally adequate to offer reasonable occupant protection against the effects of relatively low-yield nuclear weapons depending on distances from ground zero. Factors limiting habitability most likely would involve failure or inadequacy of the internal air regeneration system, outside air filter failure, sewage backups or leaks, overcrowding, contamination of stored food or water, or, in the case of standard shelters using only outside air, being forced to seal hermetically for a period in excess of that recommended. Ten days to two weeks at capacity occupancy under the most favorable conditions probably would represent the maximum period of reasonably safe use. Most Soviet open literature and intelligence reporting seem to suggest a planned occupancy of about 5 days or less.<sup>26-31</sup> There are indications for example, that a few shelters (capacity unspecified) may store only 5 days of food.<sup>25</sup>

## PROTECTION OF FOOD AND WATER RESERVES

### Water

Reporting on the protection of public water supplies against fallout has been sparse, but what there is suggests that surface water and some strata of underground water are apt to become contaminated.<sup>32</sup> Some reporting indicates that water storage facilities at treatment plants are bunkered and guarded but that the bunkering would protect only against fallout and not against blast. Other reports indicate that some of the bunkered water storage areas may offer limited

blast protection.<sup>27 33</sup> This appears to mean that water already treated and stored for use at the time of an upwind nuclear strike could be safe, but water presented for treatment in the post-strike period may be contaminated and possibly useless. Unless the Soviets are planning for the storage for civil defense purposes of large amounts of treated water, then only that water already in shelters or piped in from already treated local storage facilities could be counted on until fallout radiation reached safe levels—weeks or months later. Only a few shelters are believed to be kept stocked with water.<sup>34</sup>

The Soviets probably are planning to tap and use deep strata water, including artesian sources, in place of surface water in areas where heavy fallout is expected, but there is no indication at present how much deep strata water has been accessed for civil defense purposes.<sup>37</sup> Surface water contaminated with radioactive particles probably can be cleaned up reasonably well by passing it through micro-filters and ion-exchange resins. Because of the substantial expense involved in trying to use resin and filter purification on a national basis, we doubt that the Soviets will employ such methods except possibly in a back-up role in selected VIP shelters or relocation areas.

Over the next decade the Soviets probably will elect to emphasize deep strata water for civil defense purposes, particularly in dispersal and evacuation areas. Despite the obvious danger of radioactive contamination of water, the greatest danger will remain contamination with sewage and other organic materials.

### Food

Reporting on food storage and protection against the effects of nuclear weapons is sparse. Underground storage depots that may be hardened have been reported, and tentative assessments of amounts of food so stored have been made.<sup>35-37</sup> Most other storage sites reported would offer some degree of fallout protection but little or no blast protection.<sup>38-40</sup> Some reports indicate that in rural towns and farms downwind of target cities, grain and produce protection will consist of covering the exposed food with whatever covering materials that may be available.<sup>41 42</sup> Fresh, unprocessed foods would be difficult if not impossible to protect in a general nuclear war.

Processed foods that require no cooking are the only ones useable in most Soviet shelters.<sup>3</sup> These foods are easily stored and protected from fallout. We expect little or no fallout contamination problems with

processed foods stored in the shelters or used in dispersal or evacuation areas. In the longer term, some fallout contamination problem may arise if evacuation area occupants must use fresh unprocessed local foods, but such foods are easily checked for radioactive contaminants. One problem that has been noted with canned foods is that often they have been stored for too long a time and spoilage has been reported. An outbreak of food poisoning in a crowded shelter could have highly dangerous consequences.<sup>35 39</sup>

It has been estimated that between 13 million and 26 million urban dwellers can be sheltered in the event of a nuclear attack against the USSR. The Soviets recommend that persons occupying shelters for periods of up to two weeks receive an average of about 1,500 calories per day. Other Soviet statements concerning food allotments, however, suggest that about 1,000 calories per person per day would be acceptable. Table 2 indicates the approximate number of metric tons of food that would have to be stockpiled to provide 1,500 and 1,000 calories per day, respectively, to 13 million and 26 million people for a two-week period. Protein probably will be provided primarily as canned meat, fats as lard and vegetable oils, and carbohydrates as mixed grain flour.

Over the next few years, we expect some improvements in the preservation and storage of processed foods as a result of food processing and packaging research carried out under the Soviet manned space program. Protection of grain, livestock and produce from fallout contamination may be improved somewhat by modifying existing storage facility designs as necessary. Attempts to protect crops in the field probably would not be feasible. Over the next decade, the USSR is capable of stockpiling large amounts of foods appropriate for use in a nuclear strike situation. We cannot assess, however, whether the amounts and the means for distribution will be adequate.

### NUMBER AND QUALITY OF MEDICAL PERSONNEL

The Soviet medical establishment in 1975 was estimated to contain about 800,000 physicians\* for a physician-to-population ratio of about one to 320. In addition, there are about 525,000 feldshers (doctor's assistants), 1,185,000 nurses, and 590,000 other medical workers capable of rendering first aid and other treatment during an emergency. Since 61% of the total mid-1975 Soviet population of 254.3 million is stated

\* This figure may include military physicians.

**Table 2**  
**Soviet Food Storage Requirements**  
**for Urban Shelters**

1,500 Calories/Day	Amounts in Metric Tons for 2-Week Period		
	Protein	Fat	Carbohydrate
13 million people	6,400	7,300	77,000
26 million people	13,000	15,000	150,000
1,000 Calories/Day			
13 million people	6,400	5,500	36,000
26 million people	13,000	11,000	73,000

to be urban, an equitable distribution of physicians could be assumed to be about 60% urban and 40% rural.<sup>43</sup> It is estimated, however, that physician distribution is distinctly weighted in favor of urban areas. If one estimates that as much as 75%, or 600,000, of the available physicians are urban based, then the physician-to-urban population ratio would be about 1 to 258, a highly favorable one.

The general competence of these civilian medical personnel is considered significantly less than for comparable US personnel. All of these personnel, however, are believed to be trained to some degree in civil defense medical operations. These personnel staff at least 25,000 hospital units with at least 3 million beds.<sup>4</sup>

If all categories of medical workers are combined, the system contains an estimated one medical worker with some training for every 82 persons. The military establishment probably possesses a comparable ratio. The most significant weakness is that despite large overall numbers, the Soviets are chronically short in the civilian sector of skilled surgeons and other clinical specialists capable of managing severe trauma.<sup>44</sup> Military forces, on the other hand, are not believed to be deficient in surgeons and other trauma specialists.

The military medical establishment may assist civil defense medical forces to some extent in disaster areas that happen to contain military medical units. With a total estimated strength of between 90 and 97 thousand, the military appears to have sufficient numbers of adequately trained military physicians and paramedical personnel to carry out the military medical mission.<sup>44</sup> Each division contains a medical battalion with 23 officers and 170 enlisted men programmed to attend 400 patients in a 24-hour period. Each regiment has a regimental medical point with 15 officers and 36 enlisted men and offers emergency surgery and blood transfusion services. At

battalion level there is a battalion feldsher with four assistants who evacuate casualties from the company level to the battalion level where emergency first aid treatment is given and casualties are classified. At the company level, there is an aid point with one medical instructor and aidmen (number unknown) who render first aid only. These medical units are backed up at the frontal level by six types of 100 percent mobile field hospitals with about 700 beds each.<sup>4</sup>

This basic military medical organization has been in effect probably for a decade or longer. On the basis of Soviet computer-simulated training exercises run in the early 1970s, however, there is now some question as to the adequacy of these numbers of personnel and facilities for operations in a mass casualty environment. The results of the exercise indicated that all medical facilities in the strike zone became saturated within two days and that after two weeks the accumulation of untreated casualties reached well over one million.<sup>46</sup>

The military civil defense regiments, at least one in each military district,<sup>1</sup> probably would coordinate any cooperation between military and civilian medical units in support of population protection and rescue missions.

## TRAINING

Medical training afforded the nonmedical civilian population for civil defense purposes is limited to first aid. This training probably is sufficient for persons with no formal medical training. Despite conflicting reports on the true extent and effectiveness of the civil defense training program for the population, exposure to such training can be expected to develop some awareness of problems attending a nuclear attack and to develop some confidence in the population that by following the civil defense plan they have a reasonable chance of surviving such an attack. Even with its shortcomings, the Soviet program probably provides its population with a better chance of survival than nearly any Western power.

The extent and quality of the training for medical workers is in some doubt. The official Soviet literature and reports from physicians and other medical workers are often in conflict. Soviet articles indicate—apparently accurately—that medical personnel receive considerable civil defense medical training<sup>3</sup> but individual reports suggest that the training consists mostly of lectures, is relatively rudimentary, dull, and repetitive. Since the training often occupies free time and is compulsory, it is frequently attended by

resentment and apathy.<sup>61-64</sup> The present Soviet emphasis on civil defense training probably is aimed at overcoming these shortcomings and improving the practical value of the training. The building of training villages to promote realistic conditions and enable large-scale exercises would support the latter assumption.<sup>1</sup>

Soviet physicians, feldshers, and other medical workers are reported to receive considerable training in the medical aspects of civil defense. Physicians, for example, receive a part-time lecture course in radiological, chemical, and biological warfare defense while in medical school. The course stresses protective measures that include the use of protective clothing and masks and techniques of emergency therapy. Thereafter, many physicians and medical workers receive up to 52 hours of lectures per year (one hour per week).<sup>64</sup>

Members of medical units with a defined civil defense role receive additional training in radiobiology, bacteriology, epidemiology, and toxicology. Personal hygiene and food and water sanitation are stressed to prevent outbreaks of natural diseases following an attack with weapons of mass destruction. Practical exercises are held at some hospitals and clinics.<sup>6 58</sup>

For the population at large, civil defense training is mandatory. Fifth grade students, for example, receive first aid instruction as well as training in the use of shelters and gas masks. In the premilitary basic course given ninth and tenth grade students, 20 percent of the course is concerned with civil defense and includes basic first aid. Civil defense skills including first aid are also taught to teenagers through paramilitary competitive games.<sup>65</sup>

The working population receives a minimum of 20 hours of instruction annually, often on its own time, on self-protection in a nuclear war. Civil defense local leadership cadres may receive up to 90 hours of instruction. Details of the medical aspects of the training are unknown but are presumed to include first aid and possibly advanced first aid in the 90-hour group.<sup>1</sup>

Soviet civil defense exercises currently emphasize the performance of individuals and groups and also the coordination of the exercises with city, rayon, military, and other civil defense authorities. Over the next decade, the present level of training effort probably will be sustained.

In general, it can be said that the adequacy of medical training for civil defense is greatest for those with no medical training, less adequate for paramedical workers, and least adequate for physicians.

## MEDICAL SUPPLIES

The USSR produces most of its common drugs, antibiotics, and biologicals although certain sophisticated drugs are imported from the West in small amounts. Medical, surgical, and laboratory equipment is either manufactured or imported from Eastern Europe. The quality of most Soviet-produced drugs is adequate, but problems in quality control tend to produce variations in potency.<sup>2</sup> Poor planning and coordination within the pharmaceutical industry often result in shortages of raw materials and chemical intermediates, which tends to delay production. Distribution problems also arise frequently.<sup>23 45</sup> Another important shortcoming is the substandard packaging of finished pharmaceuticals—a shortcoming that restricts long-term storage.<sup>2</sup> Efforts are said to be under way to remedy this problem, but few overall improvements have been noted.

Surgical and other instruments generally are of acceptable quality and are produced in sufficient amounts. Few of these products, however, are disposable.<sup>2 45</sup> More sophisticated electronic medical equipment generally is obsolete by Western standards but appears to perform adequately. The greatest shortcoming is lack of standardization of spare parts and chronic shortages due to poor planning and coordination of production schedules.<sup>2 23 45</sup> The Soviets have elaborate systems of inspections and quality control, but their existence is often not reflected in the equipment itself. In the past, the Soviets have been slow to improve or modernize their medical equipment or correct chronic production problems. There is no indication to date that things have changed.

## Stockpiles for Civil Defense

The Soviets are believed to have adequate stocks of acceptable drugs and other medical supplies that can be used in the event of nuclear war. Amounts are unknown. Substandard quality control, unsophisticated packaging, problems of timely distribution, and problems of overstocking of some items, however, may well limit the effectiveness and availability of numbers of drugs. There are indications that storage conditions vary in quality from location to location, thus tending to diminish significantly the medical value of some drug items.<sup>2 23 45</sup>

Strategic stockpiles are maintained by an agency of the Council of Ministers. The stockpiles contain drugs, antibiotics, vaccines, serums, blood plasma, plasma expanders, bones for transplants, bone marrow, surgical dressings, medical and surgical instruments, hospital and laboratory equipment, and X-ray equipment.<sup>2</sup> These strategic reserves must be maintained at all times, regardless of shortages that may develop in the civilian sector. Strategic stores are said to be replaced as necessary.<sup>25 46</sup> It is suspected that much of the drugs supplied by the USSR to underdeveloped areas may be drugs rotated from the strategic stockpile that are nearing their expiration dates. The locations, item inventories, and number of days of supply of the strategic medical stockpile are not known. A particular deficiency is believed to exist in the Soviet blood

collection and preservation program for national disaster. In general, the Soviets cannot store whole blood for more than about 21 days, and they store only a small fraction of that which is stored in the US for daily hospital use.<sup>2 21 47</sup>

In addition to the strategic medical stockpile, the Ministry of Health maintains medical depots and medical sections in military general supply depots.<sup>2 48 49</sup> The Ministry of Health also maintains reserves of medical materials at large hospitals and other medical facilities.<sup>50 51</sup> The civilian system of pharmacies also maintains warehouses of drugs at certain distribution points throughout the country.<sup>2</sup> As is the case with the strategic stockpile, the reserves of the Ministry of Health and pharmacies are replenished periodically, the older materials being dispensed first.

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## ANNEX

**Description and Comments on the Specialized Hospitals of the Second Medical Evacuation Stage**

The specialized hospitals are divided into the following specialties:<sup>3</sup>

**Neurosurgical Hospital**—Each hospital collection point (BK) contains one. Wounds of the spinal column, brain, organs of the head and neck are treated. The Soviets note that substantial amounts of sophisticated electronic monitoring and diagnostic equipment will be necessary; that urologists will be needed to deal with frequent urological complications; and that since 30-40 percent of all trauma patients in peacetime show cranial and spinal injuries, surgeons in all specialties must also learn some neurosurgery. Neurosurgeons are in very short supply.

**Thoracoabdominal Hospital**—Each BK appears to have one. This hospital contains thoracic, abdominal, and urological departments but eliminates neurosurgery. A section to deal with pelvic bone injuries is appended to the urology department. The Soviets note that surgeons will make up the largest part of the professional staff but do not mention the presence of such specialties as thoracic surgery or cardiovascular surgery. Since surgeons are known to be generally in short supply, it may be that specialist-surgeons are not numerous enough to mention in a civil defense context. While the thoracoabdominal hospital is listed as a special facility, for practical purposes it contains almost as much as the main hospital (general hospital) and, therefore, uses about the same amounts and variety of medical supplies.

**Burn Hospital**—Special burn hospitals are said to be necessary because of the large numbers of burn casualties expected and the fact that serious burns cannot be successfully treated in the first stage of medical evacuation. The location of the burn hospital near ready-access routes is necessary because specialized treatment must be instituted within 24-48 hours. Burns are divided into three groups: group 1 with 30 percent of the body surface affected; group 2 with 30-80 percent; and group 3 with 80-100 percent. Group 2 is expected to be the most numerous and will receive the most attention. Those in Group 3 are considered very poor risks and are isolated and treated

with pain killers, relaxants, and fluid replacement. Hospital personnel are to be organized into five teams that operate on an assembly-line principle. The Soviets recognize that a great deal of special equipment is required for burn management but do not comment on where it will come from in the amounts that appear necessary. It is also indicated that at least six medical specialties would be required to staff each burn hospital. The source of these scarce personnel also is in serious question. Under mass casualty conditions, only casualties in group 1 that are uncomplicated with other serious injury could be treated successfully enough to permit any reasonable percentage of return to duty. Some casualties at the lower end of group 2 might eventually be returned to light duty provided that third degree burn involvement were minimal and collateral serious injury absent. A potentially serious discrepancy exists between the Soviet statement that burn therapy must be instituted within 24-48 hours, and their statement that 3 to 4 days may pass between rescue and the receipt of specialized medical care.

**Traumatological Hospital**—This type of hospital specializes in exposed and unexposed injuries of the upper and lower extremities except the pelvis and large joints. The Soviets point out that traumatological hospitals require substantial X-ray facilities and special cast making facilities that include special rooms for applying and drying the casts. The techniques described for cast making appear to be of the 1940s period. Orthopedic surgeons are believed to be in particularly short supply. Again, the Soviets appear to use nurses to perform medical services beyond their training.

**Toxicotherapeutic Hospital**—This hospital specializes in the treatment of radiation injury. The principal components of this facility include: a clinical laboratory able to do complete determinations of radioactive matter in body fluids and tissues; a blood unit with whole blood, blood fractions, and blood substitutes; and a stomatology unit. It appears unlikely that the Soviets can deploy any numbers of these hospitals due to lack of sufficient numbers of competent specialized physicians and paramedical technicians, lack of enough specialized laboratory equipment, and a lack of facilities outside major cities that can obtain, fractionate, preserve, and store various blood products.

*Infection Hospital*—This facility specializes in the diagnosis and treatment of infectious diseases likely to break out following a mass destruction weapons attack, with emphasis on biological warfare agents. Principal components of this type of hospital include the regular and isolation wards, diagnostic laboratory, etc. Facilities of the Sanitary-Epidemiological Service probably will make up the bulk of these hospitals. Since this service has many stations throughout the nation, it is likely that significant numbers of infection hospitals can be deployed. The keystone of the Soviet medical system is prevention, particularly the prevention of infectious diseases, and the Soviets should be expected to perform well in this area. On the other hand, a Soviet military training division in the Khabarovsk area suffered an outbreak of dysentery in August 1973 that spread quickly despite all efforts to contain the disease. Although this outbreak occurred under non-emergency conditions in the military, which has a better medical system than the civilian, a general panic developed and serious mistakes were made that led to many more infections than might have been the case otherwise. This occurrence is noted

here to suggest that if such a thing can happen even in areas where a generally good capability is known to exist and under near ideal conditions, far worse can be expected under mass casualty conditions.

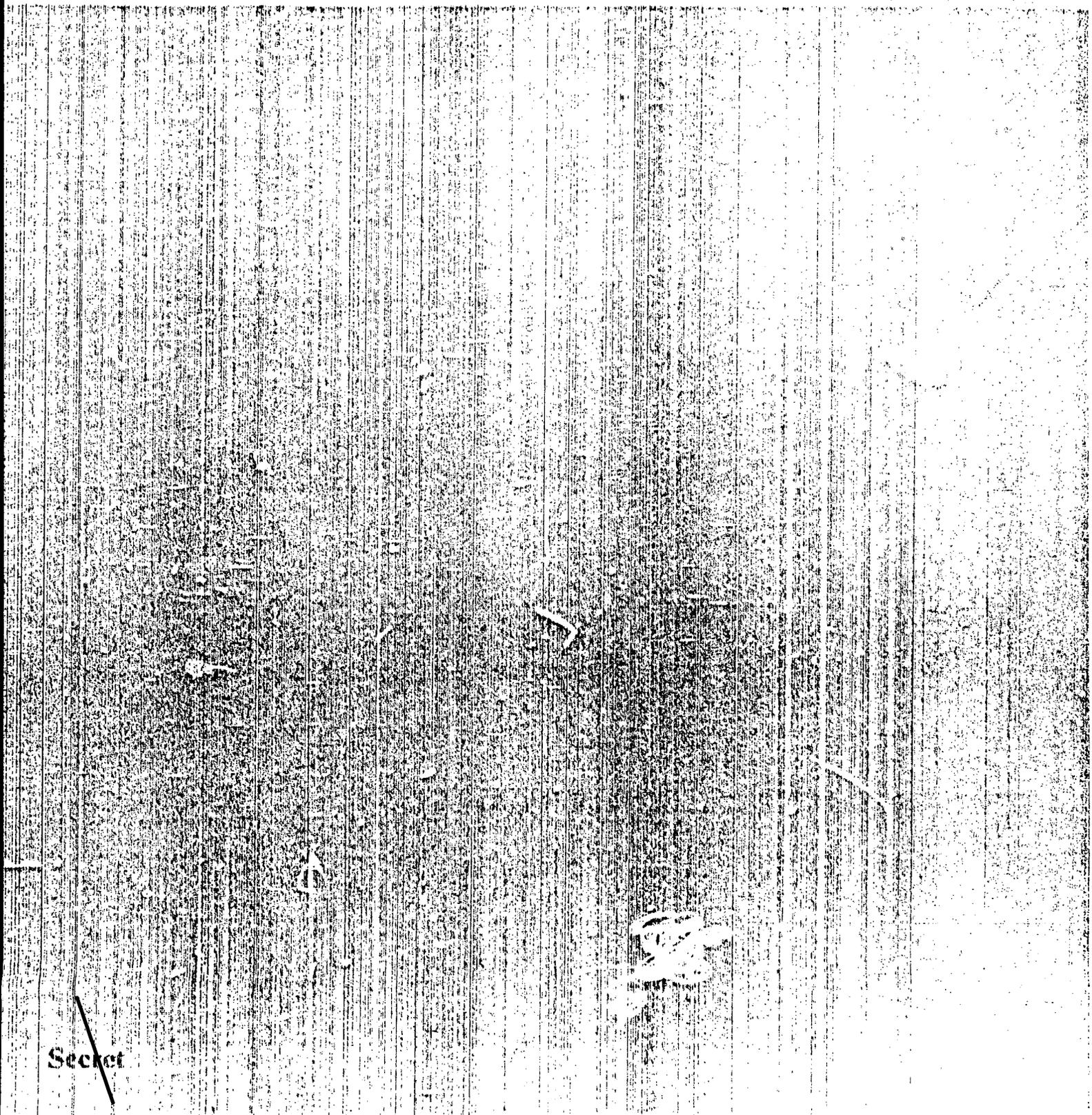
*Psychiatric Hospital*—This facility treats primarily neurological injuries and mental disturbances resulting from head injuries. It is unlikely that every BK of the hospital base (BB) will have a psychiatric (neuropsychiatric) hospital. There is reason to believe that there may be only one such facility per hospital base.

*Light casualty collecting point (PSLP)*—This facility receives and treats light casualties from the mass destruction focus. A hospital with a polyclinic is the main facility, but other hospitals in the BK can serve light casualties on an outpatient basis. The Soviets also envision using public buildings to house light casualties and using ambulatory patients and local civilians to help care for new arrivals. The PSLP also may employ ambulatory patients for public works. It is expected that a large percentage of the light casualties will be returned to work or to some civil defense duty.

This report was prepared by [redacted]  
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