

**MEDICAL-HYGIENIC ASPECTS OF PERSONNEL
AND POPULATION PROTECTION**
as Applied to the Dismantling of Nuclear Submarines
and Remediation of Sites

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**Scope of Responsibilities of the Federal
Department “Medbioextrem”**

**Federal agency of executive power that is
responsible for medical-sanitary provision of
personnel**

- Nuclear-fuel cycle,
- Dismantlement of submarines,
- Chemical weapons destruction,

population

- Closed cities

STRUCTURAL SUBDIVISIONS AND NETWORK OF SUPERVISED ORGANISATIONS OF THE FEDERAL DEPARTMENT “MEDBIOEXTREM”

Territorial level:

Medical – Sanitary Units (**73**),
Centers of State Epidemiological
Supervision (**66**),

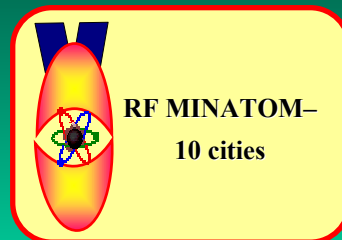
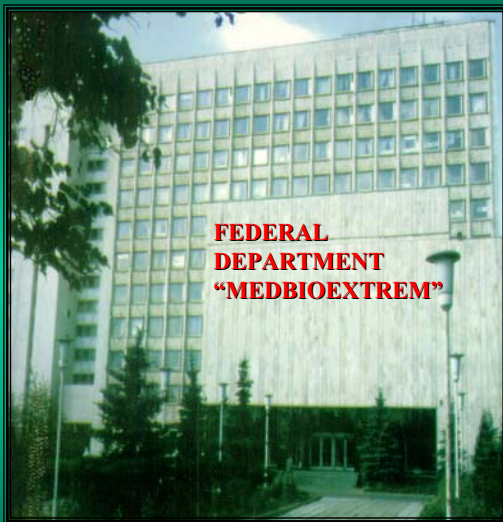
Regular and not regular Units:

Chemical brigades (**40**),
Radiation brigades (**57**),
Brigades of general specialization
(**130**),
Anti-epidemic brigades (**13**)






Federal Level:

Central administration
Special Clinical Hospitals (**9**),
Centers of Occupational Diseases (**4**),
Scientific Centers and Scientific
Research Institutes (**15**)
Emergency Medical and Radiation
Dosimetry Center

MEDICAL-SANITARY PROVISIONS OF CLOSED CITIES

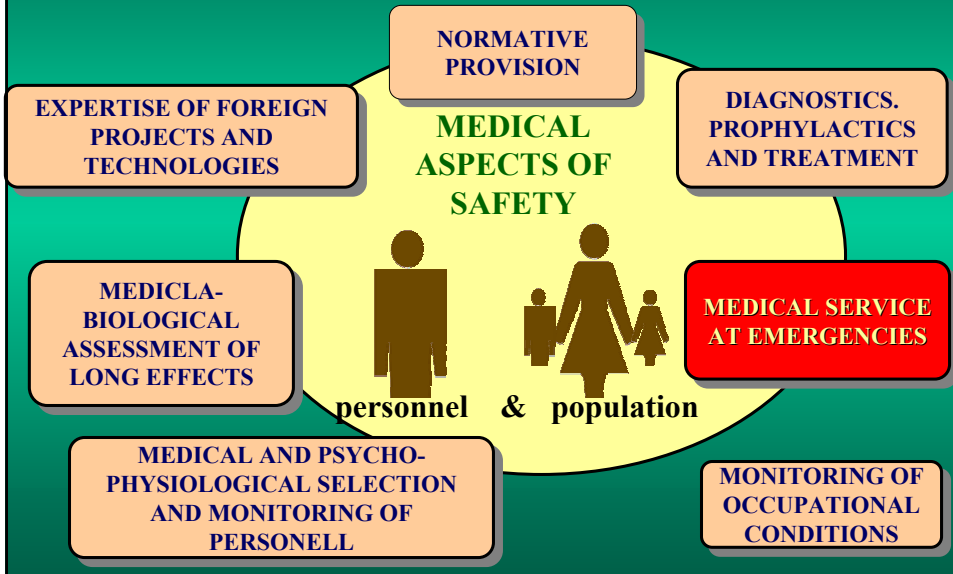


NUCLEAR AND RADIATION HAZARDOUS FACILITIES, SUPERVISED BY THE FEDERAL DEPARTMENT “MEDBIOEXTREM”

-  - facilities of fuel cycle
-  - AGENCY OF SHIPBUILDING
-  - NPPs
-  - facilities of nuclear weapons complex
-  - nuclear weapons test sites



MEDICAL-BIOLOGICAL ASPECTS OF SAFETY OF SUBMARINES DISMANTELEMENT





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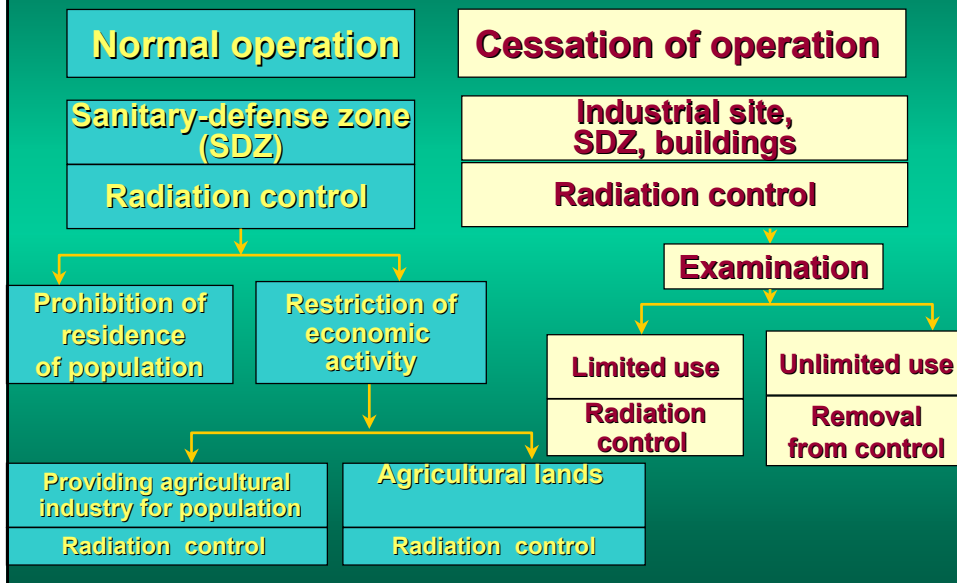
Basic legislative statements, regulating the treatment with radioactive contaminated lands

- **The Land Code of Russian Federation. 10.10.2001.**
- **The Russian Federation Federal Law № 92
«About the special restoration ecological programs for
radioactive contaminated lands». 10.07.2001.**
- **The Russian Federation Government Decree № 421
«Regulations of elaboration of special restoration
ecological programs for radioactive contaminated
lands». 14.06.2002.**
- **The Russian Federation Government Decree № 112
«Use of the lands, exposed to radioactive and chemical
pollution, for the purposes of soil improvement and
cultural-technical works, establishment of the
observation areas and preservation of objects, locating
on these lands». 27.02.2004**

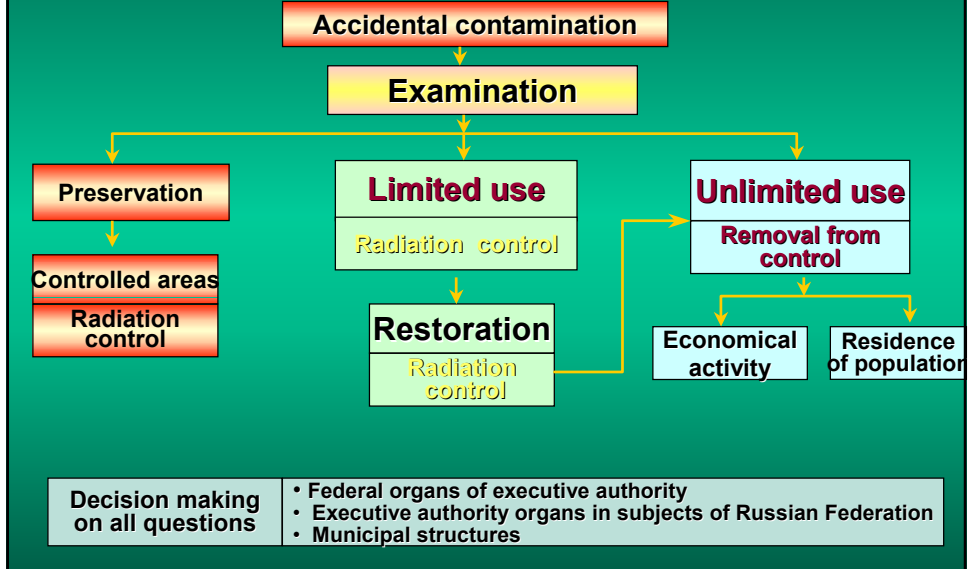
Hygienic regulation of economic activity on radiation rehabilitated objects and territories

- **MAIN SANITARY RULES OF ENSURING OF RADIATION SAFETY.** OSPORB-99. SP 2.6.1.799-99.
- **ORGANISATION OF CIVIL PRODUCTION INDUSTRY IN SANITARY-PROTECTIVE ZONE OF THE PLANTS OF MINATOM.** SanPiN 2.6.1.012-94.
- **SANITARY-DEFENCE ZONES AND ZONES OF OBSERVATION FOR RADIATION OBJECTS. EXPLOITATION CONDITIONS AND SUBSTANTIATION OF BORDERS.** GN 2.6.1.19-02.
- **HYGIENIC REQUIREMENTS TO THE QUALITY AND SAFETY OF RAW FOOD MATERIALS AND FOODSTUFFS. SANITARY RULES AND STANDARTS.** SanPiN 2.3.2.1078-01.
- **RADIATION CONTROL. STRONTIUM-90 AND CESIUM-137. FOODSTUFFS.OBTAINING OF SAMPLES, ANALYSIS AND HYGIENIC ASSESSMENT.** MUK 2.6.1.1193-03.

ECONOMIC ACTIVITY ON TERRITORIES OF RADIATION OBJECTS



TYPES OF USING CONTAMINATED AREAS



Criterion for decision making on the lands use

- The level of contamination of grounds and parameters of unfavorable action on health of the man and environment should not exceed the established specifications and standards.
- The evaluation of influence levels is realized according to the legislation of Russia in range of sanitary-epidemiological safety of the population, radiation security and environmental control.
- The summary dose of chronic population exposure caused by all adjustable radiation activities should not exceed 1 mSv per year.
- The value of boundary dose for population caused by operation of a single source of radiation makes $\approx 0,1$ mSv per year.

Types of population activity on the contaminated areas:

- Providing commercial agricultural industry
- Construction on dwellings in areas considered

Radiation-hygienic criteria for the providing commercial agricultural industry

| Criteria | Value |
|--|--------------------------|
| Exposure dose limit for population, mSv per year | 1.0 |
| Quota for Exposure dose limit for population at consumption of product, mSv per year | 0.1 |
| Limit values of surface activity (level of contamination of grounds) kBq·m ⁻² : ⁹⁰ Sr ¹³⁷ Cs | 13.0-30.0 160.0-600.0 |
| Standards on permissible levels of specific activity of radionuclides in foods (Grain, Potatoes, Milk, Meat), Bq·kg ⁻¹ : ⁹⁰ Sr ¹³⁷ Cs | 25.0-40.0 70.0-160.0 |

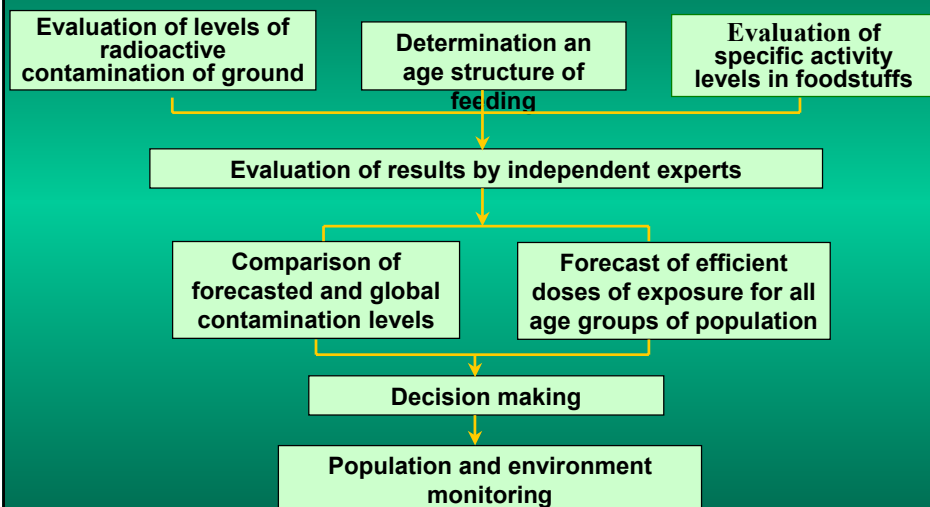
Guarantees: The consumption of aboriginal foodstuff by local population warranted provide its safety under the radiation factor.

Reference limit values of surface and specific activity of ^{90}Sr and ^{137}Cs in soil of agricultural land corresponding to permissible levels of radionuclides contents in foodstuff and a limit dose value 0.1 mSv

| Food | Radio-nuclide | Limit values of surface activity, kBq/m ² ⁽¹⁾ | | Boundary value of specific activity of soil, kBq/kg ⁽²⁾ | |
|----------|-------------------|---|----------------------|--|----------------------|
| | | Soddy-podzolic sand | Powerful black earth | Soddy-podzolic sand | Powerful black earth |
| Grain | ^{90}Sr | 0.65 | 10 | 0.0015 | 0.022 |
| | ^{137}Cs | 11.5 | 175 | 0.025 | 0.385 |
| Potatoes | ^{90}Sr | 4 | 50 | 0.010 | 0.110 |
| | ^{137}Cs | 60 | 600 | 0.135 | 1.335 |
| Milk | ^{90}Sr | 1.25 | 1.5 | 0.0065 | 0.0075 |
| | ^{137}Cs | 12.5 | 165 | 0.125 | 0.365 |
| Meat | ^{90}Sr | 1.5 | 85 | 0.0075 | 0.425 |
| | ^{137}Cs | 8 | 15 | 0.040 | 0.075 |

1. All calculations are made without the count of the contribution of background levels of contamination of soil.
2. Under production of grain and potatoes the depth of arable layer is accepted to be equal to 25 cm, for natural pastures - 10 cm.

Decision making scheme on an occupying the rehabilitating territory



Construction on dwellings in contaminated areas

Two situations should be considered:

- **construction of dwellings in areas contaminated as a result of radiation accidents**
 - No limitation for the construction, if the exposure dose for population does not exceed 10 μSv per year;
 - At exposure dose value from 0,1 before 1,0 μSv per year it is necessary to realize optimized-defensive actions;
 - If exposure dose level is more than 1,0 μSv per year, the construction is possible after carrying out of measures reducing the doses by all basic types of exposure.
- **construction of dwellings in areas released near normal working facilities**

Undoubted acceptable variant of use of the lands, taken out from jurisdiction of radiation object, is not exceeding the effective dose for population, caused by residual man-made contamination, of 10 μSv per year. The upper limit of dose, which can be perceived as social acceptable is likely to be of 100 μSv per year.

Scenario of investigation of contaminated areas located near Andreev bay

