

# **The development proposals of Psycho-Physiological Support of Human Resource Management System of NPP.**

## **Introduction**

The Psycho-Physiological Support of Human Resource Management (HRM) system of nuclear power plant (NPP) is developed on basis of an integrated approach to the selection, development and assessment of NPP personnel, including:

- Systematic approach
- Competency based approach

According to documents of IAEA<sup>1</sup>, an integrated approach have benefit in providing programmes of selection, development and assessment of NPP personnel:

- Identification the criteria and methods to selection of the applicants with the purpose of preparation of the recommendations for development and professional promotion of the applicants.
- Identification the purposes of personnel development programmes (including formal training, job rotation, on the job training, mentoring, and outside assignments) and assessment the efficiency of development programmes.
- Identification the criteria and methods to assessment of individual performance of personnel with the purpose of preparation of the recommendations for development and motivation (stimulation) of the personnel.

The system of Psycho-Physiological Support (PPS) are considered as functional subsystem of HRM system. The system of PPS are developed on basis of the competency models of the personnel and systematic approach with the purpose of maintenance a high level of safety and efficiency of NPP.

---

<sup>1</sup> Selection, competency development and assessment of nuclear power plant managers. IAEA-TECDOC-1024, 1998.

## **1. The main tasks of PPS system<sup>2</sup>**

1. The psychological and psychophysiological assessment<sup>3</sup> during the process of recruitment<sup>4</sup>.
2. The psychological and psychophysiological assessment during the process of selection the personnel for new jobs (including manager positions).
3. The planned psychological and psychophysiological assessment of individual performance of personnel to identification the purposes of development programmes (including formal training, job rotation, on the job training, mentoring, and outside assignments) and motivation (stimulation) of the personnel.
4. The planned psychological, psychophysiological and functional<sup>5</sup> assessment of personnel to prepare the recommendations for correction of negative states and identification the efficiency of prophylactic programmes<sup>6</sup>.

## **2. The main functions of PPS system**

1. The assessment of the personal characteristics: domain of attitudes, motivation, aptitudes, traits.
2. The assessment of the psychological abilities: cognitive domain.
3. The assessment of the psycho-emotional tolerance (stability): emotional domain.
4. The assessment of the work in group: domain group interaction.
5. The medical-functional diagnostics: physiological domain.

## **3. The main methods of PPS system**

1. The methods of personal diagnostics (inquirers, evaluation of behavioral indicators on basis of assessment center methods).

---

<sup>2</sup> See Appendix 1. The primary components of PPS structure.

<sup>3</sup> The psychological and psychophysiological assessment is a process that uses multiple techniques to establishes a correspondence between candidate (soft skills, attitudes, ability, aptitude, motivation etc.) and job demands (model of competency). The results of the assessment are used to predict the probability of candidate success in the job.

<sup>4</sup> See Appendix 2. The example of recruiter decision algorithm for candidate selection.

<sup>5</sup> The functional assessment is process of medical-functional diagnostics that is directed on detection of an initial stages of diseases (prenosological diagnostics) which can negative influence on safety and efficiency of NPP.

<sup>6</sup> The prophylactic programmes suppose the system of actions are directed on correction of negative psychological and functional states of personnel on basis of the rehabilitation center.

2. The methods of cognitive diagnostics (tests of abilities to learning of professional knowledge and job execution).
3. The methods of psycho-physiological diagnostics (the analysis of psycho-physiological indexes during the process of the psycho-emotional simulation of operator workloads).
4. The diagnostic training of the work in group (the method of assessment center – evaluation leader skills, skills of group interaction, role positions at the time make decisions in the group).
5. The methods of functional diagnostics (the analysis of physiological indexes for identification of an initial stages of diseases).

#### **4. The main requirements to personnel of PPS system**

1. **Head** – has an experience in HRM domain, an specialization in psychological of management, psychological diagnostics.
2. **Psychologists** - have an specialization in psychological diagnostics and methods of assessment center.
3. **Physiologist** - has an specialization in domain of physiological analysis of workload and functional states during the activity.
4. **Physician** - an specialization in medical-functional diagnostics.

#### **5. The main requirements to rooms of PPS system**

1. Head room.
2. Personnel room.
3. The room for group psychological diagnostics (testing).
4. The room for individual psychological diagnostics and interviews.
5. The room for individual psycho-physiological diagnostics.
6. The room for group psychological diagnostics (methods of assessment center).
7. The room for medical-functional diagnostics.

## **6. The main requirements to equipments of PPS system**

1. The local area network (LAN) for psychological diagnostics (computer testing).
2. The local area network (LAN) for processing, analyzing and preparing recommendations and storage of test results in database.
3. The equipments for registration of physiological data during activity.
4. The equipments for videotape recording of group psychological diagnostics (methods of assessment center).
5. The equipments for registration of physiological data during medical-functional diagnostics.

## **7. The main requirements to software of PPS system**

1. The programmes for computer psychological diagnostics<sup>7</sup>.
2. The programmes for registration and processing of physiological data<sup>8</sup>.
3. Database for collecting, keeping and analyzing of psychological diagnostics results<sup>9</sup>.
4. Database for collecting, keeping and analyzing of psycho-physiological diagnostics results<sup>10</sup>.
5. Database for collecting, keeping and analyzing of medical-functional diagnostics results.



**Mashin V.A.**

Candidate of psychological science,  
The head of laboratory of  
psycho-physiological support.

15.06.2008

---

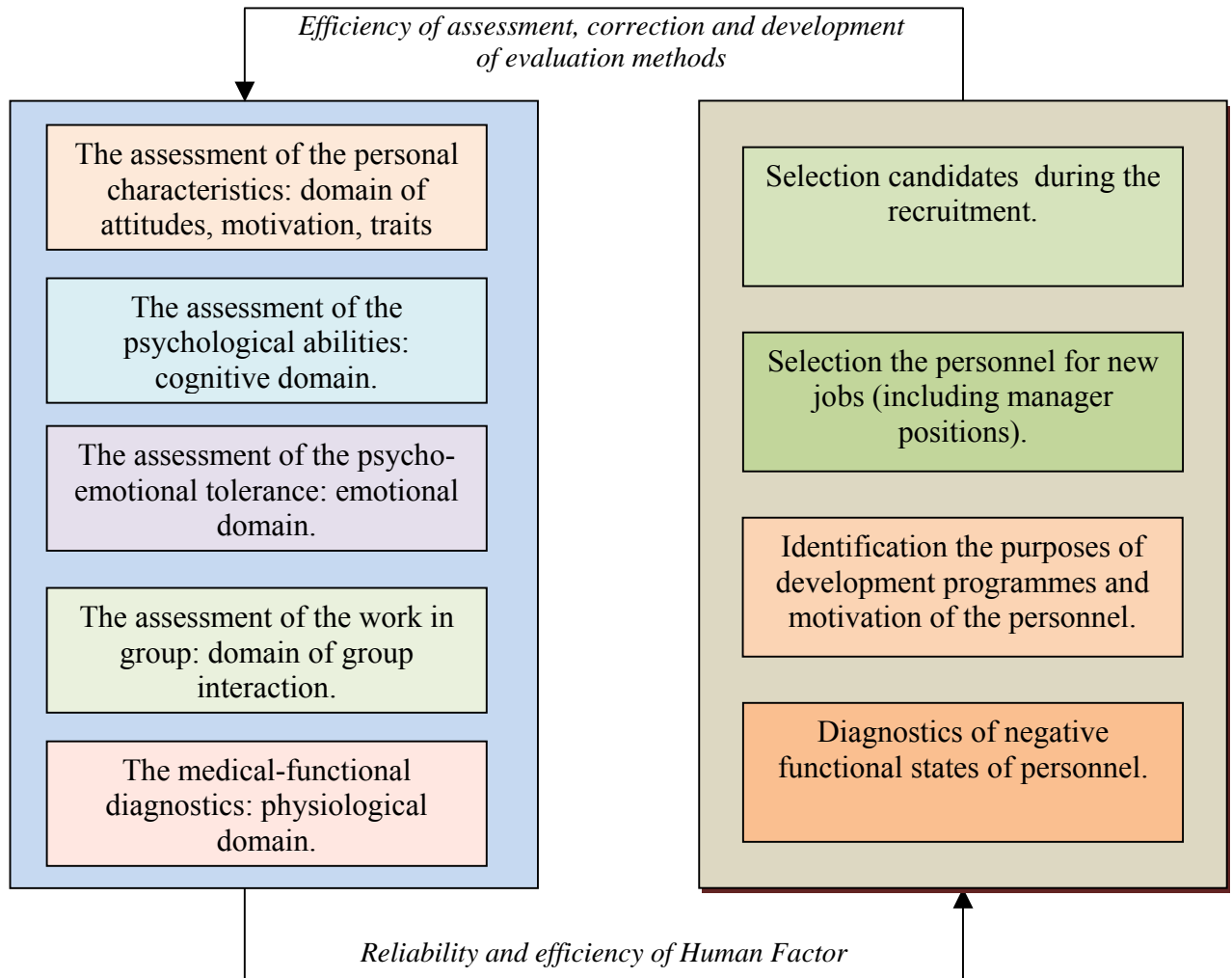
<sup>7</sup> See Appendix 3. The programme "MABP - Raven test".

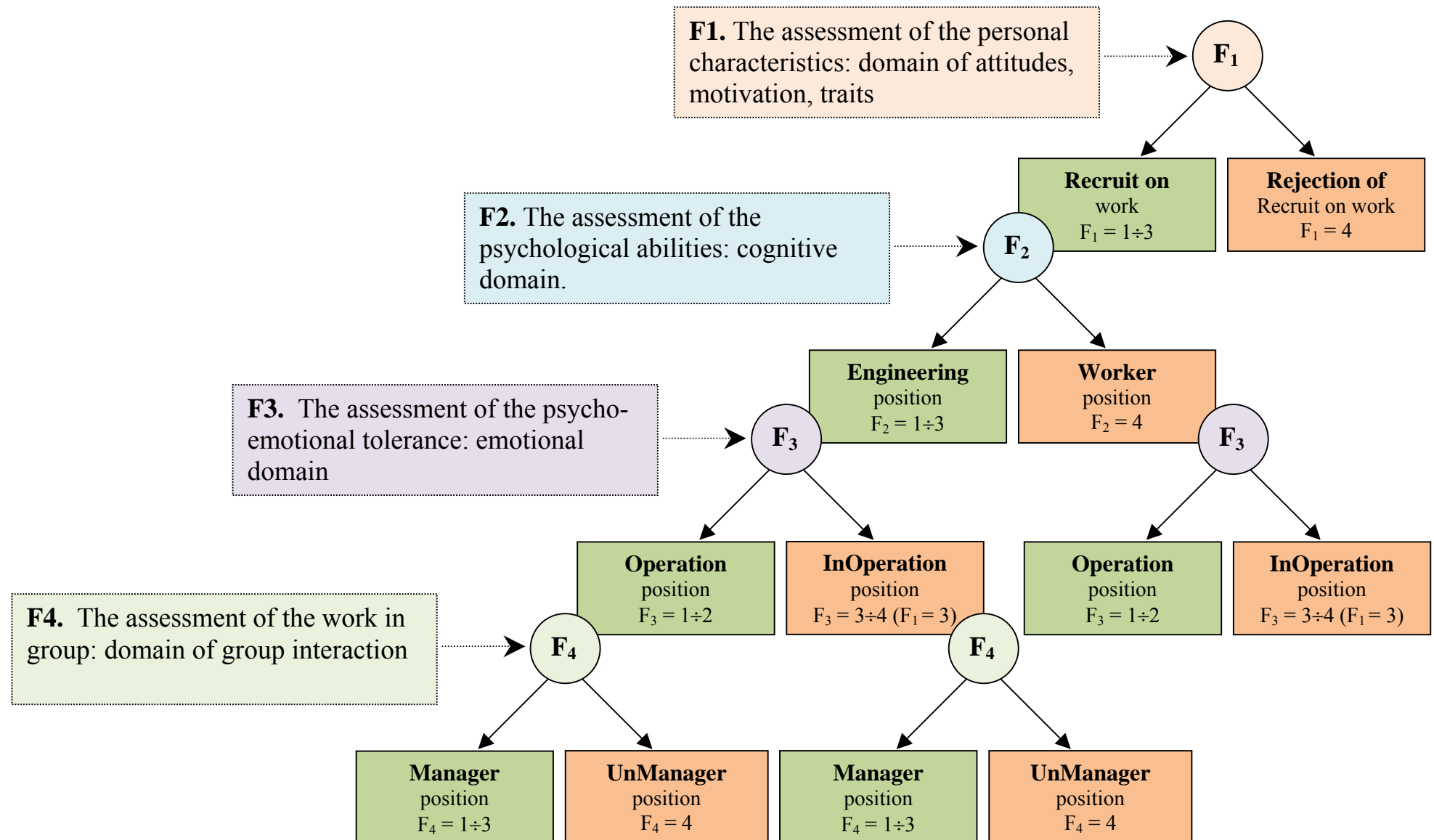
<sup>8</sup> See Appendix 4. The programme "Varicard" for registration and processing of electrocardiogram (EKG).

<sup>9</sup> See Appendix 5. Database "MABP-PFO" for collecting, keeping and analyzing of psychological diagnostics results.

<sup>10</sup> See Appendix 6. Database "MABP-HRV" for collecting, keeping and analyzing of heart rate variability.

# The primary components of PPS structure

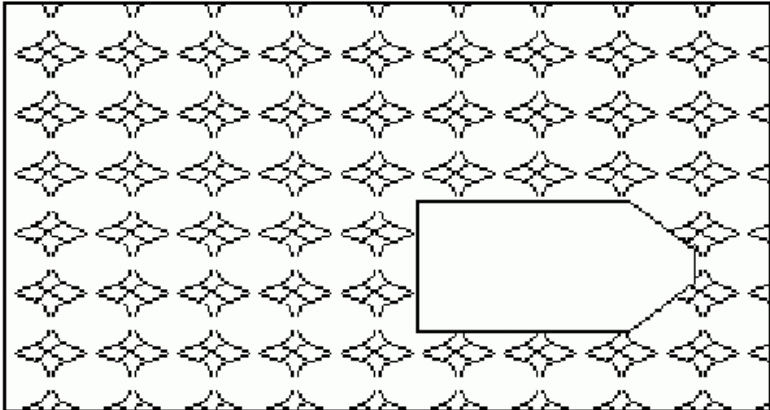


The example of recruiter decision algorithm for candidate selection<sup>11</sup><sup>11</sup> The beginning conditions are the absence of medical contraindication.

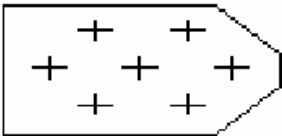
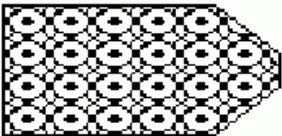

## Appendix 3. The Programme "MABP - Raven Test".

МABP - Тест Матрицы Равена

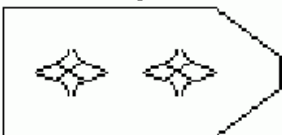
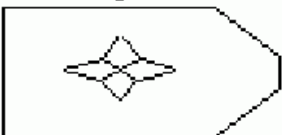
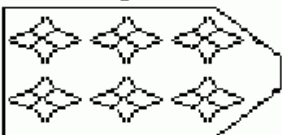
Задание 5



1 2 3

4 5 6

Выбор задания

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50
51	52	53	54	55
56	57	58	59	60

Выбор ответа

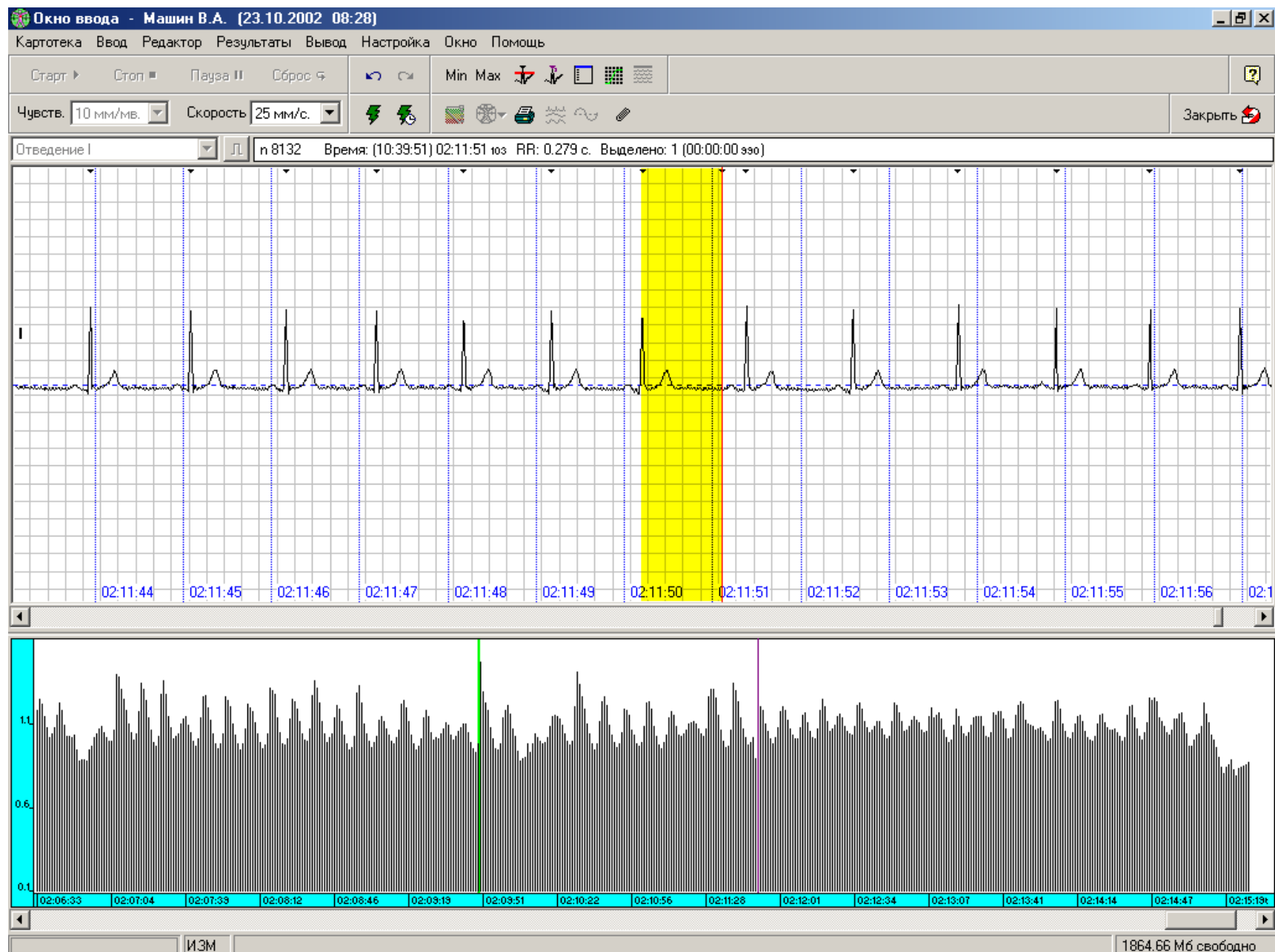
1	2	3	4
5	6	7	8

Enter - Переход

F1-Завершение теста

5-я задача из 60      Ответ: 4      Для перехода к следующему заданию используйте клавишу [Enter] или кнопки панели [Выбор задания]

## Appendix 4. The programme "Varicard" for registration and processing of electrocardiogram (EKG).





## Appendix 5. Database "MABP-PFO" for collecting, keeping and analyzing of psychological diagnostics results.

**База данных МАВР - Россия**

Данные Редактирование Результаты

Общие проценты по данным тестов КЛ-КП-ОС-4суммы-Крепелин

Дата регистрации: 11.11.1987, 21.07.1987  
 29 лет, 7 мес.

1 Фамилия: \_\_\_\_\_  
 Дата рожден: \_\_\_\_\_

	%КЛО	%КЛТ	%КЛС	%КП	%ОСН	%ОСТ	%ОСР	%4+ T	%4+ O	%4+ S	%Кр.Т	%Кр.С	%Кр.О
NN	2963	2963	2963	2662	2875	2875	2875	286	286	252	267	266	267
25 %	4	270	0.86	5	3	150	86	10.80	1	3.09	10.00	1.00	1
50 %	7	315	1.06	7	4	195	178	13.50	2	4.80	11.70	1.60	2
75 %	13	380	1.22	8	5	255	263	18.50	6	7.79	14.30	3.00	3

Дата ПФО	КЛ Ош.	КЛ Т	Форма	КЛ S	КП +	КП -	ОС N	ОС Т	Форма	ОС Р	4-Sum T	4-Sum Ош	4-Sum S	Крп. Т	Крп. Ош	Крп. S
21.07.1987	14	260	1	1.23	4	7	4	167	1	192						
11.11.1987	3	297	1	1.18	10	2	5	190	1	263						

DatePFO	%КЛО	%КЛТ	%КЛС	%КП	%ОСН	%ОСТ	%ОСР	%4+ T	%4+ O	%4+ S	%Кр.Т	%Кр.С	%Кр.О
21.07.1987	22	80	76	14	58	65	54						
11.11.1987	75	63	71	94	100	51	75						

Регистрация

Subject: КЛ: S General: КЛ: S

Индивидуальные данные по тесту КЛ: S N=2

Петров Иван Сидорович

1.2. ПСИХОЛОГИЧЕСКОЕ ЗАКЛЮЧЕНИЕ.

- Характеристика кратковременной и оперативной памяти на числа (методики: 4-КП, 5-ОС, 6-4С).
- Характеристика восприятия и анализа зрительной информации (методика 3-КЛ).
- Характеристика мышления (методики: 7-Равен, 8-ЧР, 9-Фигуры).
- Характеристика концентрации, распределения и устойчивости внимания (методики: 3-КЛ, 6-4С, 10-ШП, 11-Крепелин).
- Общая характеристика продуктивности (скорости) и надежности (безошибочности) выполнения деятельности (обобщенный анализ всех тестов).
- Характеристика личностных особенностей (ММРІ, ПДО, результаты наблюдений: поведение, работоспособность, импульсивность, эмоциональная лабильность и т.п.).

Регистрация 2:2 Петров Иван Сидорович Дата рег. 21.07.1987 Дата ПФО 21.07.1987 Воронежская АЭС Начальник смены ХС НСХС

**База данных МАВР - Россия**

Данные Редактирование Результаты Инструменты Анкета Фото Комментарий Help

Дата регистрации: 14.01.2000 / 21.01.1998

1324 Фамилия **Петров** Имя **Иван** Отчество **Сидорович**

Дата рождения: 19.03.1972 Пол: Мужской

25 лет, 10 мес.

Дата ПФО	L	F	K	1	2	3	4	5	6	7	8	9	0	Mean
21.01.1998	68	58	64	51	52	52	40	78	53	73	48	51	49	57

MMPI - анализ профиля

общительных, имеющих широкий круг интересов. Прогностически благоприятный признак.  
#41  
Конвенциональная личность, с высоким уровнем идентификации со своим социальным статусом, с тенденцией к сохранению постоянных установок, интере-

Обследуемый: КЛ: S General: КЛ: S

Передерев Виктор Михайлович

Тест MMPI: Xcp = 57 SD = 10

**1.2. ПСИХОЛОГИЧЕСКОЕ ЗАКЛЮЧЕНИЕ.**

- Характеристика кратковременной и оперативной памяти на числа (методики: 4-КП, 5-ОС, 6-4С).
- Характеристика восприятия и анализа зрительной информации (методика 3-КЛ).
- Характеристика мышления (методики: 7-Равен, 8-ЧР, 9-Фигуры).
- Характеристика концентрации, распределения и устойчивости внимания (методики: 3-КЛ, 6-4С, 10-ШП, 11-Крепелин).
- Общая характеристика продуктивности (скорости) и надежности (безошибочности) выполнения деятельности (обобщенный анализ всех тестов)
- Характеристика личностных особенностей (MMPI, ПДО, результаты наблюдений: поведение, работоспособность, импульсивность, эмоциональная лабильность и т.п.).

Обследуемый: 1324:1616 Петров Иван Сидорович Дата рег. 21.01.1998 Дата ПФО 21.01.1998 Нововоронежская АЭС динист насосной станции МБНС-МНУ-МНС-МТ

## Appendix 6. Database "MABP-HRV" for collecting, keeping and analyzing of heart rate variability.

