EPC CONTRACT

CONTRACT SPECIFICATIONS

DOCUMENT NAME:	**TECHNICAL REQUIREMENTS DOCUMENT VOLUME 5 SITE CHAPTER 5.2 SITE DESCRIPTION**
VERSION DATE:	**March 2025**

SIGNATURE PAGE

IN WITNESS WHEREOF the Owner* and the Supplier* have hereby signed this part of the EPC Contract*.

For and on behalf of the **OWNER**, **Elektrárna Dukovany II, a. s.**

Signature
Name
Title
[redacted]

Signature
Name
Title
[redacted]

For and on behalf of the **SUPPLIER, Korea Hydro & Nuclear Power Co., Ltd.**

Signature
Name
Title
[redacted]

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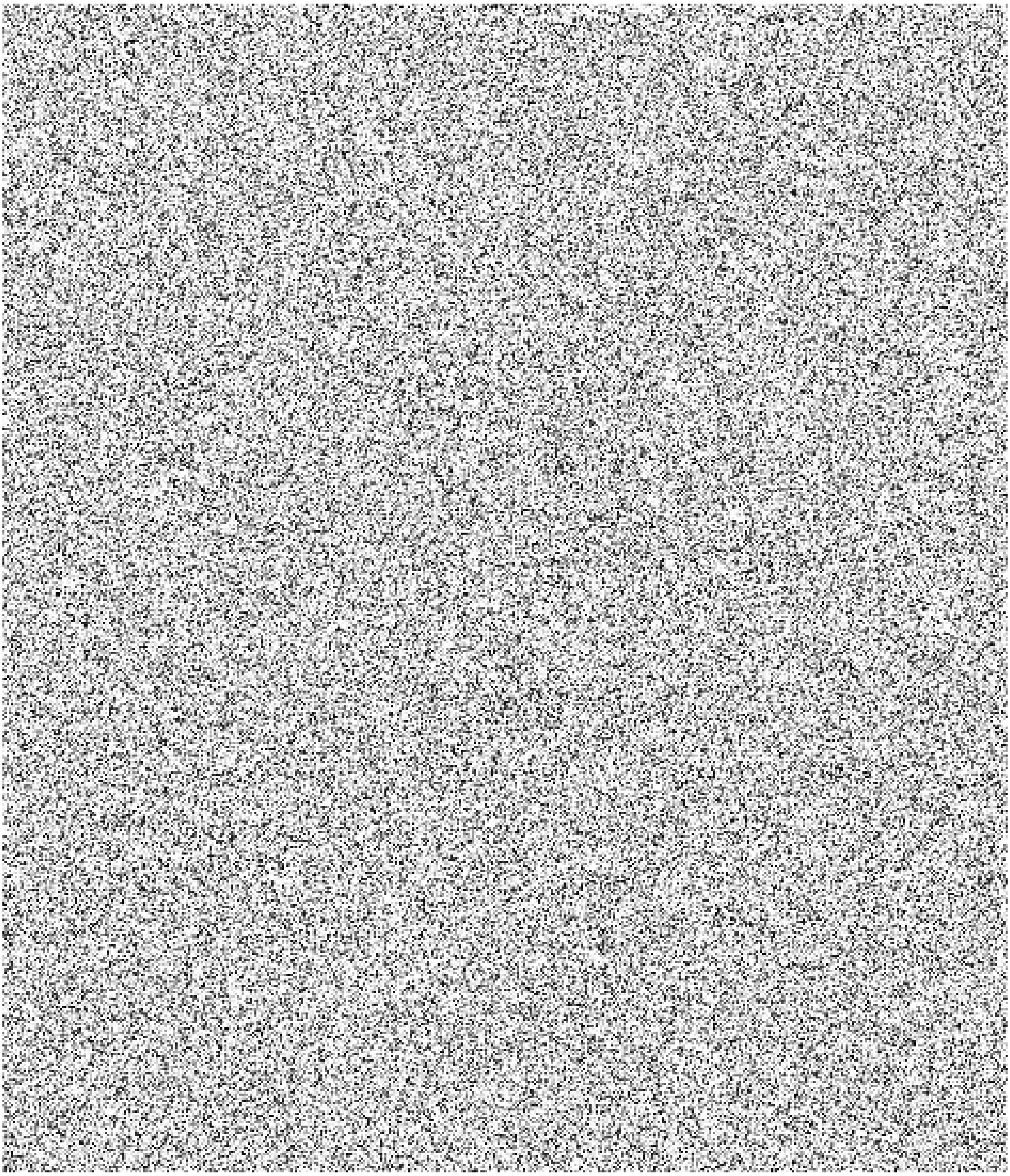
Title
[redacted]

CONTENTS

CHAPTER 5.2 SITE DESCRIPTION

5.2.1 BASIC INFORMATION



Description of the surroundings

In the close vicinity of the Construction Site* are no large industrial factories, no densely populated areas, no major transport routes, no mines, no quarries nor large warehouses of explosive or toxic materials except the Existing Nuclear Power Plant*. In the close vicinity are no intensions of the significant increase of the industrial or transportation activities. The character of the close vicinity of the Existing Nuclear Power Plant* is the agricultural and livestock production and small industrial manufactories.

Existing Nuclear Power Plant* Dukovany, adjacent to the Construction Area* A1, has been uprated and now has the installed electrical output 4×510 MWe. The Existing Nuclear Power Plant* consists of the two reactor buildings, two turbine buildings, eight cooling towers and supporting facilities. Each cooling tower is 125 m high. The cooling towers are situated in two areas, each area consists of four towers. Moreover, the Existing Nuclear Power Plant* consists of the interim storages of spent fuel and low and intermediate level Radioactive Waste* repository. Spent fuel is stored in the CASTOR containers. Low and intermediate level Radioactive Waste* is fixed by the bitumen inside the casks.

In the distant locality are these cities Třebíč (ca. 25 km), Náměšť nad Oslavou (ca.15 km), Velké Meziříčí (ca. 35 km), Ivančice (ca. 17 km), Moravský Krumlov (ca.13 km), Znojmo (ca. 27 km), Moravské Budějovice (ca. 25 km) and Brno (ca. 35 km). Municipalities Lipňany, Heřmanice and Skryje has been demolished in the past in connection with the Existing Nuclear Power Plant* construction.

Locality is connected to the railway system of Czech Republic by the railway siding with length of 16 km runs from the railway station Rakšice. The railway station Rakšice is placed on the railway corridor No. 244 which leads through the stations Hrušovany nad Jevišovkou, Moravské Bránice to Brno. The Construction Site* and the Existing Nuclear Power Plant* is connected to the road II/152 which leads through the Moravské Budějovice – Ivančice – Moravské Bránice - Modřice where is the connection on the highway D2. The road II/152 is located north of the Construction Area* A and the Existing Nuclear Power Plant*.

Furthermore, in the close vicinity of the Construction Site* are located significant natural areas that may affect the construction. These are parts of the Natura 2000 network:

- Site of Community Importance (SCI) CZ0614134 Údolí Jihlavy, with small-scale specially protected areas:
    - National Nature Reserve Mohelenská hadcová step
    - Nature Reserve Dukovanský mlýn
    - Nature Reserve U jezera
- Site of Community Importance (SCI) CZ0623819 Řeka Rokytná

Also the noteworthy tree Lípa u Lipňan is situated in contact with area D3.

Transport infrastructure at the Site* vicinity, including the potential resources of materials and equipment, are depicted at the Figure 5.2.1-1 Transport infrastructure at the Site* surroundings.

5.2.2 INDUSTRIAL, TRANSPORT AND MILITARY INFRASTRUCTURE IN THE VICINITY

In the immediate vicinity of the Plant* are not located major industrial facilities, quarries, mines, warehouses of toxic and explosive materials or frequent transport routes. Objects and sources of risk were searched as recommended by the IAEA Guide NS-G-3.1 at a Screening Distance Value (SDV) from the Plant* (depending on the type of hazard). Objects listed in the following table were identified as nearby industrial, transport and military facilities.

Table 5.2.2-1 External stationary sources of risk at Plant* vicinity

Object	Hazardous substances
Fuel station Dukovany	diesel, gasoline
Water reservoir Dukovany	liquid chlorine

Object	Hazardous substances
Hydroelectric power plant and electrical substation Dalešice	transformer oil, sulfuric acid
Electrical substation Slavětice	transformer oil
Military unit Sedlec (Airport of Czech Army in Náměšť nad Oslavou)	gasoline, kerosene, ammunition
Agricultural company Rouchovany	fertilizers, plant protection products, ammonium nitrate
Forest in the vicinity of the Plant*	flammable vegetation
Warehouse Heřmanice	flammable paints, flammable liquids, technical gases, acetylene, hydrogen and propane, liquid combustibles
Objects for storage of hay	flammable material

Road transport
Roads in a distance up to 5 km from the Plant* are:
Road No. II/152 Dukovany - Slavětice, distance 0,1 km (~ 2 600 vehicles daily)
Road No. II/399 Šemíkovice - Rouchovany, distance 3 km (~ 1 400 vehicles daily)
Road No. II/396 Rešice - Rouchovany, distance 2,7 km (~ 550 vehicles daily)
Road No. II/392 Horní Dubňany - Mohelno, distance 4,1 km (~ 450 vehicles daily)
Road transportation may carry dangerous substances such as industry explosives, fuels, liquifies petroleum gases, hydrogen, acetylene, ammonia, sulfuric acid, chloride, ammonium nitrate, hydrazine hydrate and further less toxic substances such as plastics, plant fertilizers, goods etc.

Railway transport
Railway tracks in a distance up to 20 km radius from the Plant* are:
Railway track form Rakšice to Existing Nuclear Power Plant*
Railway line Brno - Jihlava - Havlíčkův Brod, distance 11 km
Railway line Brno - Moravské Bránice - Hrušovany, distance 14 km
Railway line Okříšky - Znojmo, distance 20 km
Trains may carry dangerous substances such as ammonia water, nitric acid, sulfuric acid, oil, sodium hydroxide and ferric sulphate.

Air transport
Around the Existing Nuclear Power Plant* is prohibited airspace (except emergency flights), which has a cylindrical shape with a radius of 2 km (1,1 NM) centered at a position in the middle of the Existing Nuclear Power Plant* (coordinates 49 05 08,82 N 016 08 44,83 E) and spreading from the ground to the height of 5 000 ft AMSL (about 1 500 m above sea level).
Airport in the 10 km vicinity of Existing Nuclear Power Plant* is:

Military airport Náměšť (LKNA), N 49 10 17, E 016 06 57, concrete runway 2 400 m, distance 8 km from the Plant*

The Design-Basis of the Plant* shall consider the impact of an aircraft crash, detailed information in sections 2.1.8.3.3 INTENTIONAL AIRCRAFT CRASH and 2.4.1.3.1 AIRCRAFT CRASH.

Pipeline

Transit gas pipeline is passing in a distance of about 10,5 km south of the Plant* area (outside of SDV). It is a corridor with 3 high-pressure pipelines transporting natural gas.

- high-pressure gas pipeline transit line with internal diameter 800 millimeters and a maximum pressure 7,5 MPa.
- high-pressure gas pipeline transit line with internal diameter 1 000 millimeters and a maximum pressure 7,5 MPa.
- high-pressure gas pipeline transit line with internal diameter 1 400 millimeters and a maximum pressure 7,5 MPa.

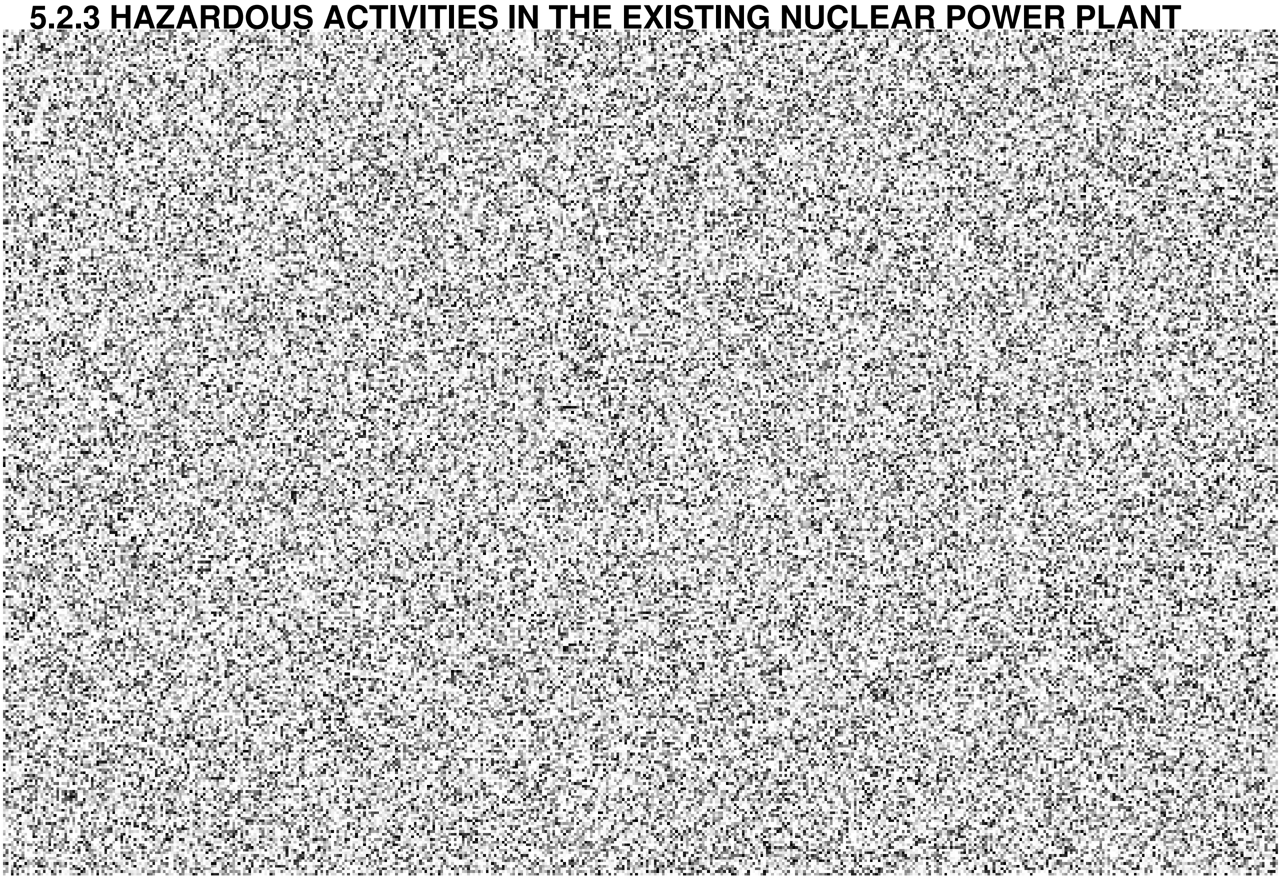
Tab. 5.2.2-3 Pipelines routes for hazardous substances in the vicinity of the Plant*

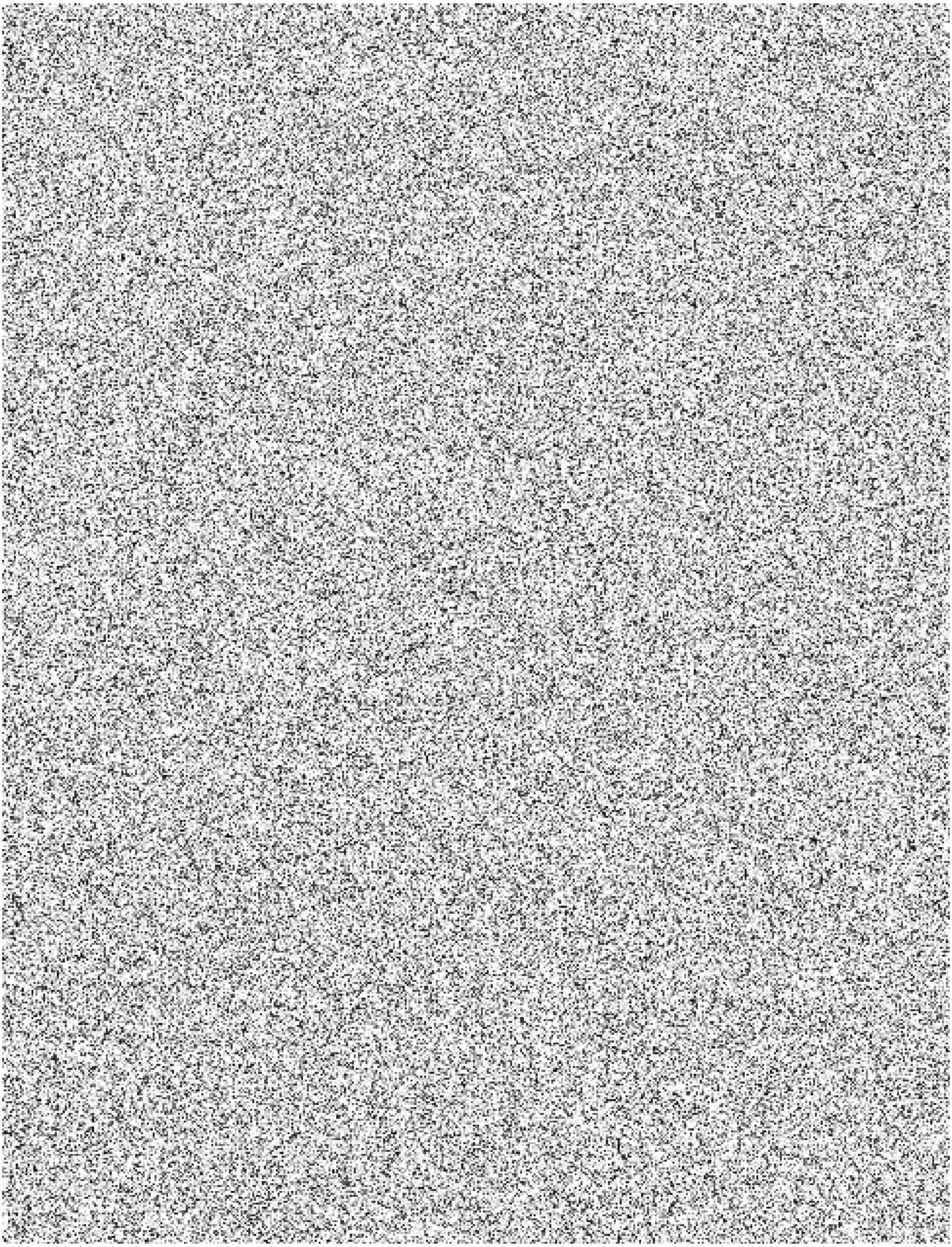
Object	Parameters of the largest pipeline	Distance and direction
existing high-pressure gas pipeline	natural gas, 4 MPa, 100 mm	1 100 m east
existing medium-pressure gas pipeline	natural gas, 0,4 MPa, 160 mm	1 100 m east
transit high-pressure gas pipeline	natural gas, 7,5 MPa, 1 400 mm	10 500 m south

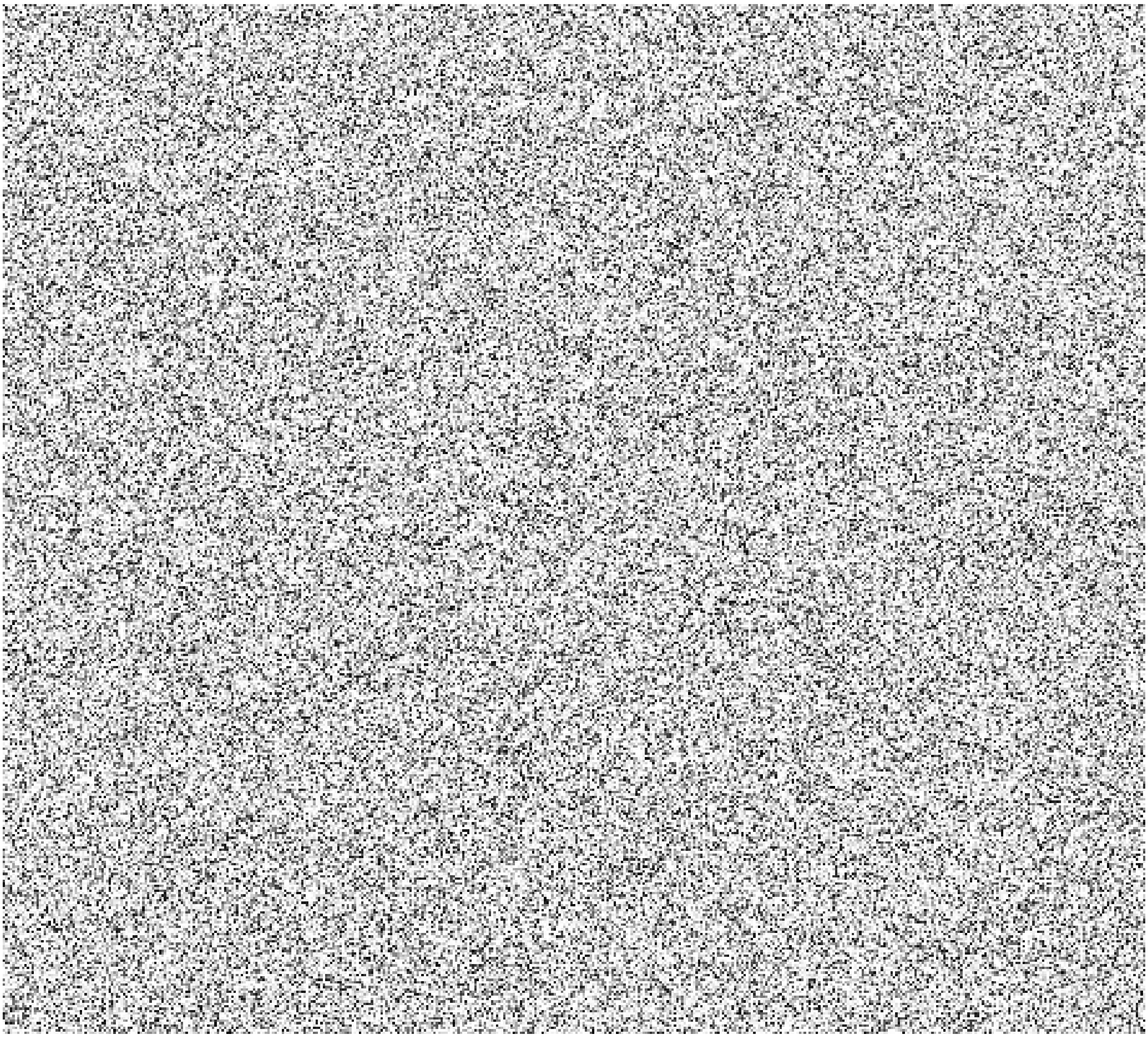
External events which cannot be neglected

Based on the background study, the external events whose interaction with the Plant* cannot be neglected are in general related with spreading cloud of toxic gases in case of accident (fires, spilling of hydrazine hydrate) on the road II/152.

5.2.3 HAZARDOUS ACTIVITIES IN THE EXISTING NUCLEAR POWER PLANT







5.2.4 METEOROLOGY

The Site* is located in a relatively narrow strip of flat surface Znojmo hills, bordered by incised valleys and rivers Jihlava and Rokytná. From macro climate point of view this area is located in temperate zone of the northern hemisphere in the center of Europe. Distant locality can be included in the interface areas MT7, MT11 and MT6 (Tab. 5.2.4-1). Site* vicinity is located in climatic area MT11.

The description of climatic condition of climatic area MT11 according to Quitt's classification:

- long, warm, dry summers
- short transitional periods with moderately warm springs and moderately warm autumns
- winters are usually short, warm, very dry with short time of snow cover

Tab. 5.2.4-1: Criteria of climatic areas MT7, MT6, MT11 according to Quitt's classification

Climatic area	MT7	MT6	MT11
Number of warm days	30 – 40	30 – 40	40 – 50
Number of days with average air temperature 10 °C and higher	140 – 160	140 – 160	140 – 160
Number of frost days	110 – 130	140 – 160	110 –130
Number of cold days	40–50	40 – 50	30 – 40
Average temperature in January (°C)	(-2) – (-3)	(-5) – (-6)	(-2) – (-3)
Average temperature in July (°C)	16 – 17	16 – 17	17 – 18
Average temperature in April (°C)	6 - 7	6 - 7	7 - 8
Average temperature in October (°C)	7 - 8	6 - 7	7 - 8
Average number of days with amount of precipitation 1 mm and higher	100 – 120	100 – 120	90 – 100
Total rainfall during the growing season (mm)	400 – 450	450 – 500	350 – 400
Total rainfall during winter season (mm)	250 – 300	250 – 300	200 – 250
Number of days with snow cover	60 – 80	80 – 100	50 – 60
Number of cloudy days	120 – 150	120 – 150	120 – 150
Number of sunny days	40 – 50	40 – 50	40 – 50

Average annual temperature of the locality for period 1961 to 2012 is 8,3 °C with a standard deviation of 0,9 °C. Usually the warmest month is July with average temperature 18,7 °C, the coldest month is January with average temperature -2,2 °C. An annual precipitation for period 1953–2012 is on average of 490 mm with standard deviation of 94 mm, and varies between 358 mm and 821 mm.

In the upper parts of highlands, the first frost day is around 1st of October and the last frost day is around 1st of May. Average wind velocity is around 3,8 m/s. There can be a formation of inversion expected at the time of clear or partly cloudy nights with wind velocity to 4 m/s and one hour before sunset till one hour after sunrise. The biggest inversion is occurring in area of Water reservoir Dalešice and near municipality Rudíkov, Příštpo, Biskupice and Mohelno.

5.2.4.1 EXTREME METEOROLOGICAL PARAMETERS

For the Site* these meteorological variables were evaluated:

- extreme instantaneous wind velocity
- extreme snow depth
- extreme rain precipitation
- extreme air temperature

Extreme Meteorological parameters were evaluated in accordance with IAEA NS-G-3.4 and SSG-18

Wind velocity

Determination of the wind loadings is based on measurements of annual maximum instantaneous wind speed values. Wind gusts 1s are measured values of instantaneous wind speed. For determination of the extreme wind load meteorological station Dukovany, Brno-Tuřany, Kostelní Myslová, Kuchařovice, Luká a Přibyslav were chosen. In terms of load the effects of this phenomenon on objects of Plant* are covered by design values of extreme wind speed with a repetition of 10 000 years.

Tab. 5.2.4.1-1: Recommended estimation values at 1s and 10 s and 10 min of wind load (m/s)

Repetition time	100 years	10 000 years
Wind gust 1 s (m/s)	46,5	63,4
Wind gust 10 s (m/s)*	37,7	51,4
10-minute mean speed (m/s)	26	35,4

**One-second gusts were measured, ten-second gusts are recalculated of one-second gusts with coefficient 0,8*

Snow conditions

Snow load is expressed by water rate of snow – water column height in mm, which arises from thawing of snow. This value contains not only water in the form of snow, but also water in the form of liquid precipitation captured by snow.

Tab. 5.2.4.1-2: Design values for water rate of snow (water column height in mm) for the Site* with repetition time of 100 years.

Parameter	Estimation method	Repetition time 100 years
Water rate of snow (mm of water column)	Gumbel MLE	117,7

Tab. 5.2.4.1-3: Design values for water rate of snow (water column height in mm) for the Site* with repetition time of 10 000 years.

Parameter	Estimation method	Repetition time 10 000 years
Water rate of snow (mm of water column)	Gumbel MLE	206,7

Precipitation

Recommended estimations are shown in the tables below and are based on the Gumbel distribution for station Kuchařovice.

Tab. 5.2.4.1-4 Recommended estimations of storm rains with repetition time of 100 years

Amount/time	Estimation method	Repetition time 100 years
mm/15min	Gumbel	31,0
mm/3hours	Gumbel	55,0
mm/6hours	Gumbel	67,0
mm/24hours	Gumbel	77,0

The above-mentioned repetition time of 100 years is standardly used for structural design and dimensioning of water drainage system in case of storm rains.
To allow a comparison of the extreme meteorological events and other meteorological parameters are in Tab. 5.2.4.1-5 given storm rains estimated for repetition time 10 000 years.

Tab. 5.2.4.1-5 Recommended estimations of storm rains with repetition time of 10 000 years

Amount/time	Estimation method	Repetition time 10 000 years
mm/15min	Gumbel	52,0
mm/3hours	Gumbel	89,0
mm/6hours	Gumbel	114,0
mm/24hours	Gumbel	125,0

Temperature

Extreme load effects of outdoor temperatures are established using the measurements of outdoor air temperatures at stations Dukovany, Kuchařovice and Moravské Budějovice.

Tab. 5.2.4.1-6 Recommended estimations of maximum and minimum air temperatures for the Site* and their assumption until 2030 and 2100.

Recommended temperature estimations (°C)	Estimation method	Repetition time		Estimation until 2030	Estimation until 2100
		100 years	10 000 years		
Maximum instantaneous temperature	Gumbel(MLE)	40,5	49	to 42	to 46
Maximum 6 hour average	Gumbel(MLE)	38,8	46,3	to 39	to 44
Maximum 24 hour average	Gumbel(MLE)	31,8	37,8	to 35	to 39
Maximum 7 day average	Gumbel(LM)	28,7	34,8	to 32	to 36
Minimum instantaneous temperature	Gumbel(MLE)	-30,8	-46,6	to -35	to -40
Minimum 6 hour average	Gumbel(LM)	-27,1	-41,4	to -34	to -38
Minimum 24 hour average	Gumbel(MLE)	-23,9	-37,3	to -25	to -30
Minimum 7 day average	Gumbel(MLE)	-18,5	-30,6	to -21	to -25

Following air humidity values for the Site* were determined by the Czech Hydrometeorological Institute (ČHMÚ).

Relative humidity to air temperature 49 °C (maximum instantaneous temperature for repetition time 10 000 years)	22 %
Relative humidity to air temperature 42 °C (maximum instantaneous temperature, that will not be exceeded by 2030 with a probability 1/10 000)	27 %

5.2.4.2 EXCEPTIONAL METEOROLOGICAL CONDITIONS

The data were processed in accordance with IAEA NS-G-3.4, article 3.13 and SSG-18, article 3.23.

Data monitored on the Dukovany meteorological station and on the nearest climatological stations in Kuchařovice, Luká a Brno-Tuřany, were used to calculate the long-term average number of days with the phenomenon (storms, icing and hailstones) in accordance with the recommendation IAEA NS-G-3.4 and SSG-18. Location of stations is described in the Technical Requirements Document*, Section 5.2.4.4

Snowstorm

This phenomenon is not observed in the Czech Hydrometeorological Institute network, it rarely occurs in this geographical latitude.

Dust and sand storm

From the data available in the framework of soil erosion monitoring and based on Czech Hydrometeorological Institute findings, it is not possible to determine height of the dust (sediment) layer for a dust storm and the corresponding probability of their occurrence for the Site.

The assessment of the dust storm was made based on available data for the U.S. Columbia power plant. As the Columbia power station is located in a semi-aride climate area where dust storm incidence is more numerous than in EDU location conditions, the design parameters in Table 5.2.4.2-1 can be considered sufficiently conservative and are used for the Plant*.

Tab. 5.2.4.2-1 Recommended estimations of dust storm parameters for the Site*

Time period	Integrated dust load	Duration	Average dust loading	Dust layer hight	Maximum pressure load
	[mg·h/m³]	[hour]	[mg/m³]	[cm]	[kPa]
10 000 let	160	18	8,9	4	0,65
100 let	21,7	3,2	6,77	1,5	0,24

Tropical storms, typhoons, hurricanes, tropical cyclones

These phenomenons do not occur in Central Europe.

Drought

Drought is defined as an uninterrupted interval of days with daily precipitation not exceeding 2 mm inclusive (i.e. a period with strong deficit of moisture).

Tab. 5.2.4.2-2 Recommended estimations of uninterrupted interval with daily precipitation up to 2 mm inclusive with repetition time of 100 and 10 000 years

Parameter	Estimation method	Repetition time	
		100 years	10 000 years
The length of uninterrupted interval with daily precipitation up to 2 mm inclusive (number of days)	Gumbel - LM	76	132

Hoarfrost

The following table contains average, maximum and minimum number of days with hoarfrost and freezing rain for the whole observation period at the Dukovany, Kuchařovice and Luká stations.

Tab. 5.2.4.2-3 Average, maximum and minimum monthly and annual number of days with hoarfrost at the Dukovany, Kuchařovice and Luká stations

Station	Observation period	Statistics	Month												Year
			1	2	3	4	5	6	7	8	9	10	11	12	
Dukovany	1984-2018	Average	6,0	1,3	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,2	1,5	5,3	14,6
		Maximum	23,0	7,0	2,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0	14,0	16,0	32,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0
Kuchařovice	1952-2018	Average	3,1	0,6	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,8	3,5	8,3
		Maximum	23,0	7,0	3,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	12,0	15,0	23,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Luká	1981-2018	Average	4,6	1,0	0,4	0,0	0,0	0,0	0,0	0,0	0,0	0,1	1,4	4,2	11,7
		Maximum	22,0	5,0	6,0	0,0	1,0	0,0	0,0	0,0	0,0	2,0	9,0	13,0	36,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0

Tab. 5.2.4.2-4 Average, maximum and minimum monthly and annual number of days with freezing rain at the Dukovany, Kuchařovice and Luká stations

Station	Observation period	Statistics	Month												Year
			1	2	3	4	5	6	7	8	9	10	11	12	
		Average	2,5	0,9	0,4	0,0	0,0	0,0	0,0	0,0	0,0	0,1	1,1	3,6	8,5

Station	Observation period	Statistics	Month												Year
			1	2	3	4	5	6	7	8	9	10	11	12	
Dukovany	1983-2018	Maximum	8,0	4,0	3,0	0,0	0,0	0,0	0,0	0,0	0,0	3,0	6,0	13,0	24,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Kuchařovice	1971-2018	Average	2,3	0,7	0,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,9	2,7	6,9
		Maximum	7,0	4,0	2,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	6,0	10,0	15,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	1,0
Luká	1981-2018	Average	1,5	0,4	0,2	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,6	1,9	4,6
		Maximum	5,0	2,0	2,0	1,0	0,0	0,0	0,0	0,0	0,0	0,0	2,0	6,0	10,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

Hailstones

The following table contains average, maximum and minimum number of days with hailstones for the whole observation period at the Dukovany, Kuchařovice and Luká stations.

Tab. 5.2.4.2-5 Average, maximum and minimum monthly and annual number of days with hailstones at the Dukovany, Kuchařovice and Luká stations

Station	Observation period	Statistics	Month												Year
			1	2	3	4	5	6	7	8	9	10	11	12	
Dukovany	1982-2018	Average	0,0	0,0	0,0	0,1	0,3	0,2	0,1	0,2	0,1	0,0	0,0	0,0	1,1
		Maximum	1,0	0,0	1,0	1,0	4,0	2,0	1,0	2,0	1,0	0,0	1,0	0,0	7,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Kuchařovice	1961-2018	Average	0,0	0,0	0,1	0,1	0,4	0,2	0,2	0,1	0,0	0,1	0,0	0,0	1,3
		Maximum	0,0	1,0	1,0	1,0	2,0	1,0	2,0	2,0	1,0	1,0	2,0	0,0	4,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Luká	1975-2018	Average	0,0	0,0	0,1	0,2	0,3	0,4	0,2	0,1	0,1	0,0	0,0	0,0	1,5
		Maximum	0,0	0,0	1,0	2,0	3,0	2,0	2,0	2,0	2,0	1,0	1,0	1,0	5,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

The following table contains occurrence of the biggest hailstones in the locality and its neighbourhood.

Tab. 5.2.4.2-6 The biggest hailstones in the locality and its neighbourhood.

Station	Date	Hailstone diameter [cm]
Přerov	13.6.2019	4 - 5
Hradčany na Prostějovsku	13.6.2019	3
Luká*	23.6.2002	4
Luká*	1.7.2019	4
Dukovany*	28.7.2018	1,6
Kostelní Myslová*	14.6.2000	2
Kuchařovice	6.6.2009	2

Based on historical data about maximum hailstones in the locality, Czech hydrometeorological institute set the maximal hailstones in the site vicinity should be up to 5 cm in diameter.

Lightning

The following table contains average, maximum and minimum number of days with storm for the period 1982 - 2018 at the Dukovany station. The annual average number of days with storm approximately corresponds to the average annual number of days with occurrence of at least 2 flashes of lightning into the ground within a distance of 10 and 15 km.

For the sake of comparison, the table below contains the number of days with storm at the Kuchařovice, Luká and Brno-Tuřany stations

Tab. 5.2.4.2-7 Average, maximum and minimum monthly and annual number of days with storm.

Station	Observation period	Statistics	Month												Year
			1	2	3	4	5	6	7	8	9	10	11	12	
Dukovany	1982-2018	Average	0,0	0,1	0,1	1,3	4,0	5,0	5,4	4,2	0,9	0,1	0,0	0,1	21,2
		Maximum	0,0	2,0	1,0	4,0	10,0	10,0	11,0	13,0	5,0	1,0	1,0	1,0	34,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	1,0	0,0	0,0	0,0	0,0	0,0	13,0
Kuchařovice	1961-2018	Average	0,1	0,1	0,2	1,5	4,7	6,6	6,7	5,4	1,1	0,1	0,0	0,1	26,6
		Maximum	1,0	2,0	1,0	6,0	11,0	14,0	13,0	13,0	4,0	1,0	1,0	2,0	37,0
		Minimum	0,0	0,0	0,0	0,0	0,0	1,0	2,0	0,0	0,0	0,0	0,0	0,0	14,0
Luká	1974-2018	Average	0,0	0,1	0,3	1,2	4,0	4,7	5,1	3,9	1,1	0,1	0,0	0,0	20,6
		Maximum	1,0	2,0	2,0	7,0	9,0	11,0	10,0	10,0	6,0	1,0	1,0	0,0	32,0
		Minimum	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	10,0
Brno-Tuřany	1961-2018	Average	0,1	0,1	0,3	1,4	5,1	7,0	7,1	5,4	1,6	0,1	0,0	0,1	28,2
		Maximum	1,0	1,0	3,0	7,0	11,0	13,0	13,0	12,0	4,0	1,0	1,0	2,0	41,0
		Minimum	0,0	0,0	0,0	0,0	0,0	2,0	1,0	0,0	0,0	0,0	0,0	0,0	17,0

Tornados

The nearest tornados that occurred relatively near the Site* were several tornados of F1 intensity at a distance of 30-40 km from the Site*. The nearest tornado of F2 intensity was recorded at a distance of 40-50 km (Großharras locality) from the Site*.

Tab. 5.2.4.2-8: The probability of occurrence of a tornado on a given intensity for the Site*.

Intensity of tornado	Repetition time			
	100	10 000	100 000	1 000 000
F1	0,001	0,140	1,4	14,004
F2	0,001	0,082	0,824	8,244
F3	0,000	0,015	0,149	1,492
F4	0,000	0,006	0,060	0,599
F1 and higher	0,002	0,243	2,434	24,340
F2 and higher	0,001	0,103	1,034	10,336

Tab. 5.2.4.2-9 Initiating tornado parameters for the Site*

Maximum wind velocity (m/s)	Translation velocity (m/s)	Maximum rotary wind velocity (m/s)	Maximum rotary velocity radius (m)	Air pressure drop (hPa)	Air pressure drop rate (hPa/s)
72	14	57	45,7	40	13

Note: These parameters are in accordance with US NRC RG 1.76 – Region III

Waterspouts

This phenomenon is not observed in the Czech Hydrometeorological Institute network, it rarely occurs in this geographical latitude.

5.2.4.3 METEOROLOGICAL PARAMETERS INFLUENCING DISPERSION

Meteorological parameters influencing dispersion and background documentation for the locality diffusion model consist of:

- the atmosphere stability category. The stability category also determines the turbulence conditions and vertical temperature layers
- data on the flow vector
- data on precipitation

Data were processed in accordance with IAEA NS-G-3.2, article 2.23 – 2.7.
Dispersion conditions in the atmosphere listed in IAEA NS-G-3.2 may be collectively expressed by stability classes.

Stability category

Values in Tab. 5.2.4.3-1 were processed as an average for the period 2000-2018 based on measurements results of an automatic weather station as programs for calculating the stability classes according Pasquill scale with sampling after 10 minutes.

Tab. 5.2.4.3-1 Relative frequency of stability classes on the Dukovany station

Average frequency in the period	Category						Total
	A	B	C	D	E	F	
	strongly unstable (labile)	unstable	slightly unstable	indifferent (neutral)	stable	strongly stable	
2000-2018	13,3	8,4	14,3	42,5	8,8	12,7	100

Wind direction and velocity

Mean wind velocity for individual stability classes depending on the flow direction is listed in table below (average for the period between 2000 – 2018). For processing the values of frequency, direction and speed the data measured by wind speed measurement system (i.e. currently used methodologies for atmosphere stability assessment) were used.

Tab. 5.2.4.3-2 Mean wind velocity for individual stability classes depending on the flow direction. Average for the period 2000-2018.

Sector	Category A.F	Category A	Category B	Category C	Category D	Category E	Category F
N	3,45	4,98	3,15	3,32	4,15	2,97	1,47
NNE	3,04	3,96	3,14	3,48	3,81	2,76	1,29
NE	3,28	4,10	3,18	3,75	3,89	2,92	1,38
ENE	3,26	3,53	3,06	3,56	3,84	3,14	1,50
E	3,42	2,79	3,25	3,71	3,98	3,24	1,46
ESE	4,38	3,80	4,49	4,41	4,99	3,24	1,39
SE	5,05	5,24	4,16	5,19	5,68	3,31	1,41
SSE	3,23	3,56	3,19	3,80	3,52	2,81	1,53
S	2,94	3,58	2,76	3,01	3,40	2,81	1,45
SSW	2,76	3,17	2,69	3,00	3,20	2,79	1,42
SW	3,06	4,07	2,71	3,37	3,48	2,81	1,40
WSW	3,89	4,55	3,48	4,42	4,58	3,05	1,48
W	5,12	3,57	4,62	5,34	6,03	3,32	1,58
WNW	5,02	4,84	5,55	5,30	5,73	3,22	1,56

Sector	Category A.F	Category A	Category B	Category C	Category D	Category E	Category F
NW	4,83	5,86	3,99	4,76	5,42	3,41	1,64
NNW	4,47	5,42	4,33	4,70	5,21	3,55	1,66
Total	4,13	4,79	3,96	4,36	4,85	3,20	1,50

Tab. 5.2.4.3-3 Specification of class velocity

Class	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Velocity [m/s]	0-0,1	0,1-1,0	1,1-2,0	2,1-3,0	3,1-4,0	4,1-6,0	6,1-8,0	8,1-12	12,1-16	16,1-20	20,1-25	>25,1
Class velocity	0,05	0,6	1,5	2,5	3,5	5	7	10	15	18	22,5	25,1

Tab. 5.2.4.3-4 Relative wind direction frequencies for each wind velocity class at the Dukovany station without distinguishing stability classes period between 2000-2018.

Cat. A - F	Wind velocity class											
Sector	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Total
N	0,05	0,61	1,40	1,39	1,24	1,66	0,54	0,21	0,02	0,00	0,00	0,00	7,11
NNE	0,03	0,46	0,75	0,61	0,52	0,62	0,21	0,06	0,00	0,00	0,00	0,00	3,25
NE	0,03	0,48	0,92	0,96	0,88	1,11	0,33	0,08	0,00	0,00	0,00	0,00	4,79
ENE	0,04	0,47	1,09	1,45	1,58	1,77	0,23	0,03	0,00	0,00	0,00	0,00	6,67
E	0,04	0,44	1,10	1,44	1,72	1,99	0,37	0,05	0,00	0,00	0,00	0,00	7,15
ESE	0,02	0,30	0,68	0,82	1,11	2,35	0,99	0,32	0,01	0,00	0,00	0,00	6,61
SE	0,02	0,27	0,55	0,61	0,80	1,87	1,38	0,77	0,01	0,00	0,00	0,00	6,27
SSE	0,02	0,26	0,61	0,65	0,49	0,48	0,19	0,09	0,00	0,00	0,00	0,00	2,80
S	0,03	0,31	0,73	0,74	0,60	0,57	0,12	0,02	0,00	0,00	0,00	0,00	3,12
SSW	0,02	0,27	0,61	0,68	0,51	0,37	0,07	0,01	0,00	0,00	0,00	0,00	2,54
SW	0,02	0,33	0,71	0,74	0,55	0,60	0,14	0,06	0,00	0,00	0,00	0,00	3,14
WSW	0,01	0,27	0,62	0,72	0,58	0,79	0,39	0,21	0,03	0,00	0,00	0,00	3,62
W	0,02	0,29	0,79	1,18	1,13	1,91	1,34	1,09	0,18	0,03	0,00	0,00	7,97
WNW	0,02	0,30	0,72	1,21	1,27	1,93	1,34	1,02	0,16	0,02	0,00	0,00	7,99
NW	0,03	0,46	1,28	2,17	2,39	4,12	2,56	1,54	0,12	0,01	0,00	0,00	14,66
NNW	0,03	0,52	1,32	1,84	2,09	3,69	1,94	0,81	0,07	0,00	0,00	0,00	12,31
Total	0,40	6,03	13,89	17,20	17,47	25,84	12,14	6,36	0,62	0,06	0,01	0,00	100,00

Turbulence indicators in the atmosphere

Stability classes see Section 2.4.2.3.2, contain information about the turbulence rate in the atmosphere, which is required for the calculation of diffusion models. Therefore no additional turbulence indicator is required.

Precipitation and humidity

Tab. 5.2.4.3-5 Distribution of precipitation intensity frequency at station Dukovany distinguished classes

Class		I	II	III	IV	V	VI	VII	VIII	IX	X	Total
Precipitation intensity [mm/h]		0	0.0–0.1	0.2–0.4	0.5–1.0	1.1–2.0	2.1–3.0	3.1–6.0	6.1–10	10.1.–20.0	> 20	>=0
Year	2004	94,34	1,84	1,58	1,45	0,52	0,09	0,11	0,05	0,01	0,00	100
	2005	93,89	1,89	1,76	1,63	0,39	0,15	0,22	0,07	0,00	0,00	100
	2006	99,02	0,83	0,15	0,00	0,00	0,00	0,00	0,00	0,00	0,00	100
	2007	95,01	1,73	1,66	0,92	0,38	0,14	0,12	0,02	0,01	0,01	100
	2008	98,72	0,58	0,43	0,17	0,08	0,02	0,01	0,00	0,00	0,00	100
	2009	90,87	2,90	3,83	1,40	0,61	0,14	0,21	0,02	0,02	0,01	100
	2010	92,58	2,56	2,45	1,33	0,64	0,22	0,14	0,04	0,04	0,01	100
	2011	95,50	1,51	1,57	0,77	0,38	0,12	0,09	0,03	0,01	0,01	100
	2012	95,23	1,59	1,41	0,79	0,50	0,18	0,16	0,07	0,04	0,02	100
	2013	95,98	1,17	1,04	0,67	0,41	0,23	0,32	0,11	0,05	0,01	100
	2014	93,47	2,12	2,52	0,92	0,54	0,18	0,15	0,05	0,05	0,01	100
	2015	94,15	1,71	2,15	1,03	0,55	0,16	0,17	0,05	0,02	0,02	100
	2016	93,53	1,49	2,69	1,12	0,70	0,32	0,11	0,02	0,01	0,01	100
	2017	92,20	2,74	2,42	1,47	0,83	0,15	0,16	0,00	0,01	0,01	100
	2018	96,80	0,10	0,10	2,32	0,33	0,13	0,11	0,05	0,04	0,03	100
Average		94,75	1,65	1,72	1,07	0,46	0,15	0,14	0,04	0,02	0,01	100

Air temperature

Relevant temperature data are implicitly included in the stable class category according to Pasquill, therefore these data do not need to be provided in the dispersion studies.

Inversion

Analysis of the inversion frequency was processed based on meteorological measurements from 48 stations of the Czech Hydrometeorological Institute located in the Czech Republic between 1 January 1961 and 31 March 2012, regardless of the observation completeness. The meteorological parameters were measured by professional stations with hourly measurements. The following aspects were used for the calculation: the number of lowest observed layers of clouds and the base height and wind velocity. Furthermore, data on the height of the Sun above the horizon were also used.
Tab. 5.2.4.3-6 contains (from the left) name of the station, geographical location, start and end of observation and number of processed cases (hours with observation).

Tab. 5.2.4.3-6 List and location of stations used for the calculation of the average inversion frequency in the Czech Republic

Station	Altitude (m)	Longitude (°)	G. Latitude (°)	Beginning	End	Number of cases
Bechyně	409	14,4708	49,3	1.1.1961	10.7.1992	140319
Brno	241	16,6889	49,1531	1.1.1961	31.3.2012	314760
Červená	749	17,5419	49,7772	1.1.1961	31.3.2012	294151
České Budějovice	420	14,4292	48,9469	1.1.1961	30.6.1994	162651
České Budějovice	394	14,4714	48,9519	1.1.1961	31.3.2012	27891
České Budějovice	395	14,4714	48,9519	4.1.2000	31.1.2008	76834
Doksany	158	14,1703	50,4583	1.1.1995	31.3.2012	150347
Dukovany	400	16,1344	49,0958	1.10.1995	31.3.2012	142338
Holešov	222	17,5697	49,3206	1.1.1961	31.3.2012	203696
Cheb	483	12,3911	50,0686	1.1.1961	31.3.2012	324026
Chotusice	235	15,3858	49,9419	1.1.1961	31.3.2012	194399

Station	Altitude (m)	Longitude (°)	G. Latitude (°)	Beginning	End	Number of cases
Churáňov	1118	13,615	49,0683	1.1.1961	31.3.2012	325350
Karlovy Vary	603	12,9143	50,2016	17.4.1961	31.3.2012	299035
Kocelovice	515	13,8408	49,4669	1.3.1975	31.3.2012	277447
Kopisty	240	13,6233	50,5442	27.4.2000	31.3.2012	26331
Kostelní Myslová	569	15,4392	49,16	1.1.1961	31.3.2012	312438
Košetice	534	15,0797	49,5733	1.1.1989	31.3.2012	111626
Kuchařovice	334	16,0864	48,8825	1.1.1961	31.3.2012	301855
Liberec	398	15,0242	50,77	1.1.1961	31.3.2012	314242
Luká	510	16,9533	49,6522	1.10.1974	31.3.2012	163112
Lysá Hora	1322	18,4478	49,5461	1.1.1961	31.3.2012	317600
Mariánské Lázně	540	12,7183	49,9272	1.7.1995	1.1.1999	21936
Milešovka	833	13,9314	50,5547	1.1.1961	31.3.2012	208386
Mošnov	250	18,1217	49,6983	1.1.1961	31.3.2012	314776
Pardubice	225	15,7406	50,0161	1.1.1961	31.3.2012	192357
Pec pod Sněžkou	824	15,7288	50,6921	1.9.1988	31.3.2012	144972
Plzeň	360	13,2694	49,6764	1.1.1961	31.12.1981	60085
Plzeň	360	13,3786	49,765	1.7.2004	31.3.2012	67860
Plzeň	343	13,3833	49,7431	4.1.2000	30.6.2004	38280
Polom	748	16,3228	50,3519	1.1.2006	31.3.2012	54720
Pouchov	243	15,8433	50,2456	1.1.1961	31.12.1981	59639
Praděd	1490	17,23	50,0828	1.1.1961	15.9.1997	75463
Praha	364	14,2578	50,1008	1.1.1982	31.3.2012	253368
Praha	282	14,5425	50,1217	1.1.1961	31.3.2012	196107
Praha	232	14,4277	50,0693	1.9.2002	31.3.2012	83670
Praha	302	14,4469	50,0081	1.1.1982	31.3.2012	247733
Přerov	203	17,4064	49,4239	1.1.1961	31.3.2012	192755
Přibyslav	530	15,7625	49,5828	1.1.1961	31.3.2012	208153
Přimda	742	12,6781	49,6694	1.1.1961	31.3.2012	279289
Sedlec	474	16,1206	49,1708	1.1.1961	31.3.2012	194680
Sněžka	1602	15,7403	50,7358	18.10.2008	1.1.2012	22525
Svratouch	737	16,0336	49,735	1.1.1961	31.3.2012	313205
Šerák	1328	17,1086	50,1875	1.1.2004	31.3.2012	71709
Temelín	503	14,3419	49,1978	1.1.1989	31.3.2012	200964
Tušimice	322	13,3281	50,3767	1.1.1982	31.3.2012	265009
Ústí nad Labem	375	14,0411	50,6839	1.1.1979	31.3.2012	270850
Ústí nad Orlicí	402	16,4222	49,9803	1.1.1961	31.3.2012	160594
Žatec	273	13,5775	50,3789	1.1.1961	31.12.1981	53648

5.2.4.4 DATA FROM METEOROLOGICAL STATIONS AND THEIR INSTRUMENTATION

Input data for assessed meteorological parameters were obtained from the measuring network of the Czech Hydrometeorological Institute. The station selection for individual indicators was based on articles 2.12 to 2.31 of IAEA NS-G-3.2 and on the operating experience of the Czech Hydrometeorological Institute.

Tab. 5.2.4.4-1 Stations used for the analysis of climatic situations within a distance of 80 km from the Site*

Station	Distance from the Site* (km)	Altitude (m above sea level)	Used for the characterization											
			Temperature	Wind	Precipitation	Snow	Snow storm	Dust and sand storm	Drought	Hoarfrost	Hailstones	Lightning	Tornadoes	Dispersion
Brno-Tuřany	41	241		x	x		x	x	x			x	x	
Budišov	25,2	485				x	x	x					x	
Dukovany	0	400	x	x	x	x	x	x	x	x	x	x	x	
Džbánice	9,4	337				x	x	x	x				x	
Hrotovice	9,7	425				x	x	x	x					
Kostelní Myslová	51	569		x	x		x	x	x				x	
Kuchařovice	24	334	x	x	x		x	x	x	x	x	x	x	
Luká	87	510		x			x	x		x	x	x	x	
Miroslav	17,9	238				x	x	x					x	
Moravské Budějovice	32	460	x			x	x	x					x	
Náměšť nad Oslavou	13,8	390				x	x	x	x				x	
Pohořelice	30	180			x		x	x	x				x	
Přibyslav	62	530		x			x	x					x	
Svratouch	70	737					x	x					x	
Třebíč, Podklášteří	28,5	463				x	x	x					x	
Velká Bíteš	23,5	485				x	x	x					x	

In accordance with IAEA NS-G-3.4, article 3.1, the instrumentation and its installation in measuring stations that obtained the data is designed exclusively in accordance with World Meteorological Organization (WMO) requirements and following methodological regulations of the Czech Hydrometeorological Institute. The technological equipment of individual stations and observation times and methods are therefore comparable at all stations.

5.2.5 HYDROLOGY

The Site* and its surroundings is located on the border of two main river valleys which numbers are 4-16-01 Jihlava and 4-16-03 Rokytná.

Hydrographically it is:
- Hydrography river valley of the 1-st class of the Danube river No. 4-00-00
    - Hydrology river valley 3-rd class of the Jihlava river up to the Oslava No. 4-16-01;
    - Hydrology river valley 4-th class of the Skryjský stream No. 4-16-01-104;
    - Hydrology river valley 3-rd class of the Rokytná river No. 4-16-03
    - Hydrology river valley 4-th class of the river Olešná above the Řešický stream No. 4-16-03-046 ;

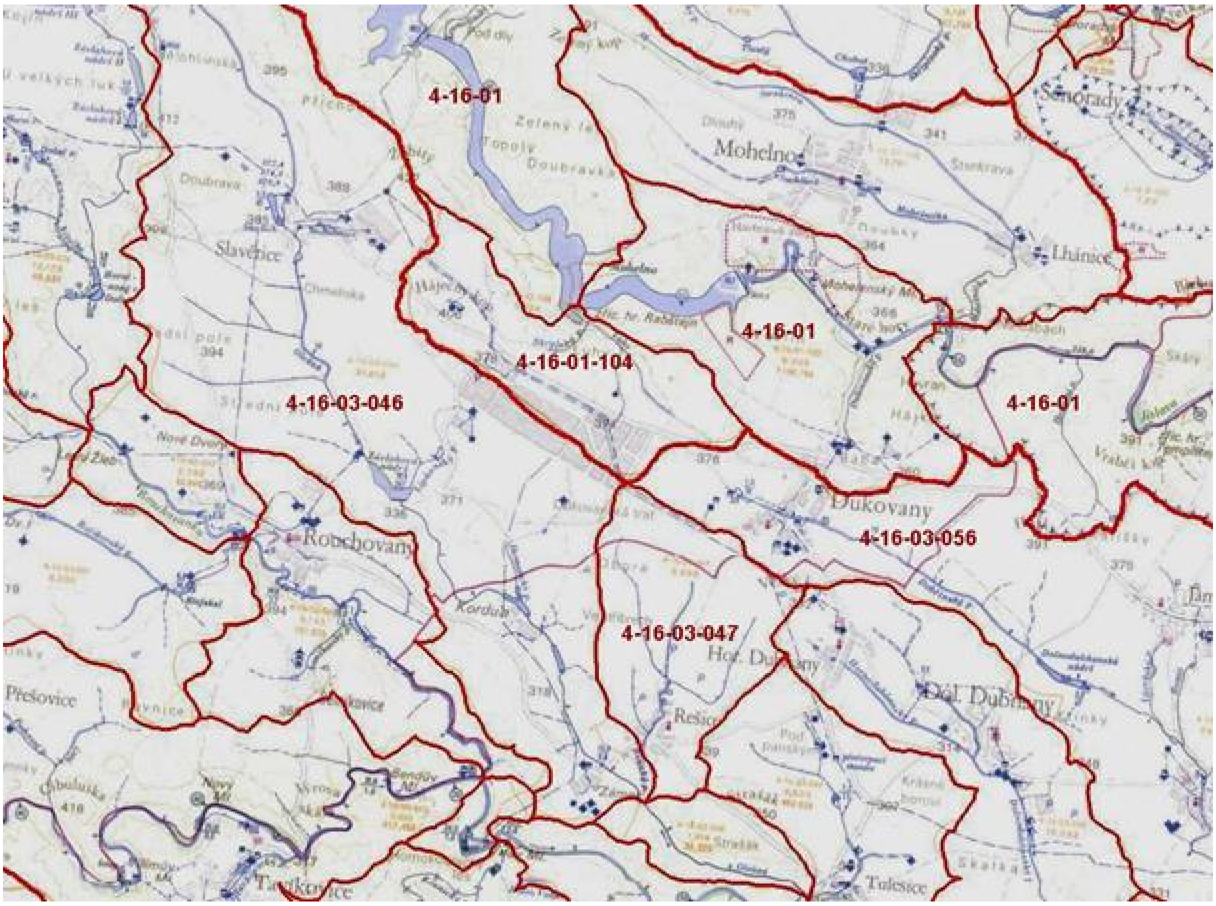


Fig. 5.2.5-1 - Section of the basic water management map of the Czech Republic 1:50 000 - hydrology structure of the river valleys

Part of the river valley No. 4-16-01-104 is the Skryjský stream and stream Luhy, which flows to the Skryjský stream. Skryjský stream consequently flows to the water reservoir Mohelno on the Jihlava river. Skryjský stream discharges the storm water and wastewater from the Existing Nuclear Power Plant*. Water reservoir Mohelno on the Jihlava river serves as the source of the raw water for the Existing Nuclear Power Plant* too.

Part of the river valley No. 4-16-03-046 are Lipňanský stream and Heřmanický stream. Both flows to the river Olešná, which consequently flows to the river Rokytná which is emptied to the river Jihlava at the city Ivančice.

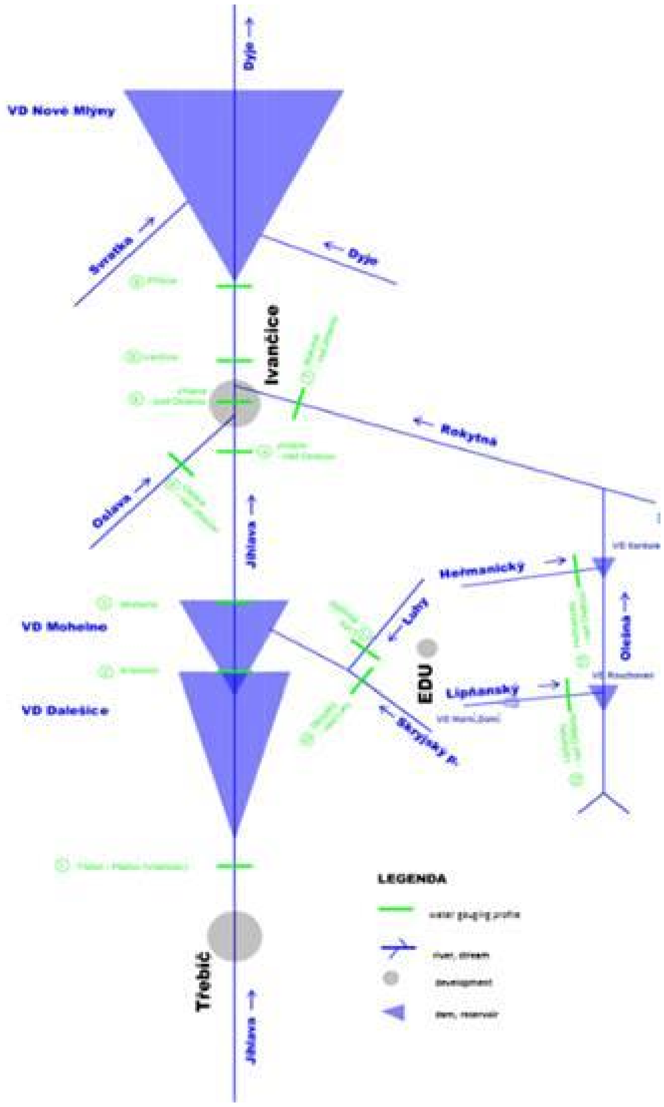


Fig. 5.2.5-2 Schematic catchments area of Jihlava river

Jihlava river

Jihlava river is the biggest river in the surroundings of the Site*. Jihlava river rises on the south hillsides of Lísek u Jihlávky at the elevation 670 m a.s.l. Jihlava river flows to the middle reservoir Nové Mlýny nearby village Ivaň at the elevation 170 m a. s. l.. The area of its river valley is 3 117 km^2 and its length is 184,5 km.

Jihlava river is located ca. 1 km north from the Site*. There is Jihlava river raised by the water structures creating reservoirs Dalešice – Mohelno. Water reservoir Dalešice is dedicated as the higher reservoir for the pumped storage hydroelectric power plant. Water reservoir Mohelno is lower retaining reservoir for the water of the pumped storage hydroelectric power plant, and also serves as the source of the raw water for the Existing Nuclear Power Plant*. The dam of the water reservoir Mohelno also contains the flow hydro power plant.

Water structure Dalešice - Mohelno

The set of the reservoirs Dalešice - Mohelno provides following functions:

- Hydro energy

- Usage of the hydro energy at the pump hydro power plant Dalešice for the purposes of production of the peak energy for the equalizing of the chart of the day load, for the self-regulation of the frequency and output power, as the reserve output power in case of malfunction of the different power plant and as the means for the solving of difficulties at the superordinated energy network.
- Usage of the hydro energy at the flow hydro power plant Mohelno
- Water management
- Source of the raw water for the Existing Nuclear Power Plant*
- Improvement of the sanitary conditions at the river
- Flood protection
- Common usage (recreation, fishing, etc.)
- Flow rate improvement
- Flow rate improvement of the Jihlava river below the reservoir Mohelno to Q_{355d} (according to §36 Act No.254/2001 as amended) = 1,2 m^3/s at the free and strict manipulation period
- Flow rate improvement of the Jihlava river below the reservoir Mohelno to Q_{355d} (according to §36 Act No.254/2001 as amended) = 0,78 m^3/s at the strict and very strict manipulation period

Skryjský and Luhy stream
Skryjský stream is the right inflow of the Jihlava river, which is mouthed to the water reservoir Mohelno. The stream Luhy flows to the Skryjský stream.

On the Skryjský stream is the retention reservoir, which serves as the reservoir for the inflow of the storm water and waste water discharge from the Existing Nuclear Power Plant*. On the Skryjský stream are 3 small flow hydro power plants.

Stream Luhy takes surface water only from its surrounded area.

Lipňanský stream
Lipňanský stream springs at the south direction from the On-Site Facility Area B1. In the close distance of the spring there are located small ponds (Horní, Dolní) of the local importance e.g. fishing. Lipňanský stream flows to the irrigation reservoir (Rouchovany) located nearby on the river Olešná.

Heřmanický stream
Heřmanický stream springs south from the On-Site Facility Area B2. The stream is at the upper part partially tubed underground at length 300 m. Heřmanický stream flows to the reservoir Kordula on the river Olešná.

Rivers Olešná, Rokytná
River Olešná is the small river, which is located south from the Site*. River Olešná empties water from the streams and drainage systems. The Olešná river flows to the river Rokytná. The river Rokytná flows to the river Jihlava in the Ivančice city. Mentioned rivers flows through the woodless area of the small slope. River valley area Rokytná is 584,3 km^2 and its length is 88,2 km.

Underground water, geothermal and mineral springs
Long-therm specific outflow of the underground water is 0,5 - 1,0 $l/(s.km^2)$ at this region, which classifies the region as the region with the slight or very low underground specific outflow. In

accordance with the measurement of the locality, which is in progress from the year 1996, the specific outflow of the underground water is 1,5 l/(s.km^2).

Presence of the geothermal and mineral springs has not been discovered at the Site*.

In accordance with the water management, the new Unit* cannot consider the usage underground water as the source of the technology, drinking or the fire water.

Protected areas in accordance with the water management
Protected area in accordance with the water management are listed in the national Implementation plan of the Frame directive from the 8.1.2003. In this register are not listed any protected areas determined for protection of economically significant types bounded to the water environment. Such a water environment is not placed on the Czech Republic.

Areas determined as the source of the drinking water for the human consumption.
Site* does not influent to any of the protected area determined as the source of the drinking water.

Areas determined for the protection of the economically significant species related with the water
At the Site* there are not registered any areas determined for the protection of the economically significant species related with the water.

Water or the areas determined for the recreation including the areas for the swimming
Neither the place from where the raw water to be pumped nor the place where the process wastewater to be discharged are registered as the nature swimming area.

The water reservoir Nové Mlýny, its nature swimming area (KO621301 and KO621302) will be indirectly influenced by the new Unit* by its offtake of the raw water and discharge of the process wastewater.

Areas sensitive on nutrients
Any surface water or reservoirs in the Czech Republic in accordance with § 15 of Gov. order No. 401/2015 Coll. as amended, are designated as sensitive areas with specific water discharge quality limits.

Nitrate vulnerable areas
Nitrate vulnerable area is the term defined by the Nitrate directive (91/676/EHS). There are areas consisting of all or the part of the river valley, where the agricultural activities negatively influences the concentration of the nitrates of the surface and underground water. The Site* is located within the nitrate vulnerable area.

Floods history of the Site*
The Site* is located on the plateau at the elevation 383,5 - 389,10 m a. s. l.. The effluent of the surface water is to the deeply cut rivers Jihlava nad Rokytná.

The water reservoir Mohelno, which is located the 1,0 km north from the Site*, has the dam structure ca. 2,0 km from the Site*. The head of the dam structure has the elevation 307,15 m. a. s. l.. The water surface level of the maximal flood (Q100) is at 303,30 m. a. s. l..

From the records of history floods results, that on the Jihlava river above the water structure Dalešice-Mohelno there were only floods lower than Q100.

From the above stated results, that effluent of the extreme floods did not endanger the Site* and the Site* will not be endangered by the potential occurrence of the Q1000.

Other surface streams within the Site* surroundings are streams of the 2 levels lower than Jihlava river. There are constructed small ponds. The area of the biggest pond has the water surface ca. 0,5 ha. The ponds are located in the lower elevation than the Site* and, therefore, the Site* is not endangered by the floods from the small streams.

Consideration of the internal floods

From the above stated results that the Site* cannot be endangered by the floods caused by the closest river or streams, except the pumping station of the raw water, which will be located on the Jihlava river.

The risk for the new Plant* will be only the internal floods, i.e. the floods caused by the extreme precipitation on the Site*. This status represents the floods caused by inoperable storm water drainage. This chapter does not concern the internal floods caused by technology malfunction.

5.2.5.1 BASIC HYDROLOGICAL DATA

5.2.5.1.1 JIHLAVA RIVER

river	profile	$S_{CATCHMENTAREA}$ [km²]	precipitation [mm/year]	outfall [mm/year]	φ	q_S [l/s.km²]	Q_a [m³/s]	Q_{100} [m³/s]
Jihlava	Ptáčov	962,71	662	182	0,28	5,77	5,401	260,0
Jihlava	Kramolín	1139,07	647	173	0,27	5,49	6,19	310,0
Jihlava	Mohelno	1155,23	646	146	0,23	4,63	5,351	191,5

5.2.5.1.1.1 PROFILE JIHLAVA-(PTÁČOV

Basic characteristic of water gauging profile Jihlava - Ptáčov

river:	Jihlava	A	P_a	Q_a
hydrological code:	4-16-01-0193	[km²]	[mm]	[m³/s]
watergaugingprofile:	Ptáčov	962,71	662	5,401

N-years flow rates at water gauging profile Jihlava – Ptáčov

N	1	2	5	10	20	50	100
Q_N	45,5	67,1	101,7	132,2	166,3	217,1	260,0

M-days flow rates at water gauging profile Jihlava - Ptáčov

M	30	60	90	120	150	180	210	240	270	300	330	355	364
Q_M	11,9	8,01	6,21	4,99	4,09	3,44	2,94	2,55	2,18	1,87	1,53	1,10	0,75

AVERAGE MONTH FLOW RATES (m^3/s) IN THE JIHLAVA RIVER – PROFILE PTÁČOV

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
January	1,74	3,19	8,24	3,95	7,63	4,37	5,57	3,01	4,74	4,33	3,48	3,36	10,43	13,77	5,48	4,79	2,54	2,65	6,09	1,66	4,29	12,27	7,64	9,59	2,68	10,59
February	2,77	1,49	8,41	2,46	5,82	6,18	2,48	9,73	4,06	7,89	17,31	7,27	13,76	4,73	16,64	7,08	2,81	9,92	5,84	2,77	3,79	6,06	7,31	11,42	3,03	5,52
March	6,79	2,80	11,08	9,09	6,91	6,06	10,19	11,24	6,68	19,21	18,42	10,78	10,37	8,62	11,52	19,35	22,34	11,00	8,84	24,82	18,01	5,92	9,53	10,52	3,36	4,69
April	4,25	3,47	8,14	5,47	8,42	8,83	23,70	12,05	4,65	5,12	11,23	9,05	6,61	4,04	12,47	7,70	30,44	4,68	5,39	8,32	10,08	4,42	3,95	8,13	2,18	4,32
May	3,70	4,77	2,60	2,28	4,05	5,73	18,75	6,46	2,37	3,59	3,03	5,42	3,44	5,44	5,95	3,79	8,27	2,23	2,90	2,70	5,31	2,68	2,10	6,18	3,72	2,52
June	2,42	3,56	2,14	1,72	2,10	5,90	5,34	2,92	3,27	4,00	1,74	3,00	3,38	2,82	5,10	2,38	5,97	2,02	2,21	4,13	9,64	2,56	2,61	12,75	2,37	1,45
July	1,29	1,86	1,60	1,45	1,24	2,77	4,37	14,57	2,34	5,56	1,73	6,21	2,83	1,73	2,43	5,26	4,14	1,29	2,08	10,32	3,81	2,80	2,21	3,56	1,66	0,95
August	0,90	4,66	1,05	0,88	0,97	1,68	3,54	5,25	1,57	1,91	2,43	4,83	16,14	1,26	1,64	4,17	9,82	1,04	1,58	3,73	8,94	3,10	1,63	2,98	3,16	1,36
September	1,29	1,37	1,20	2,10	1,66	6,96	4,03	3,43	3,10	2,08	1,69	6,95	6,99	1,36	2,08	3,48	2,90	2,90	1,60	1,95	8,22	3,73	1,56	3,29	8,80	1,25
October	1,87	1,59	1,70	2,08	1,87	3,63	6,66	3,71	3,79	2,53	3,37	5,18	9,58	2,88	2,90	3,49	2,76	2,96	2,05	3,61	8,34	3,30	2,23	3,04	6,85	2,63
November	2,25	2,25	1,93	2,12	1,84	4,91	6,39	3,11	6,43	2,06	2,01	4,02	12,20	1,90	4,34	1,91	2,67	7,64	2,40	3,32	3,80	2,05	1,94	2,30	4,23	3,27
December	2,01	3,92	2,75	7,63	2,52	6,00	4,25	8,11	4,88	1,77	2,17	4,61	9,47	2,25	3,31	2,43	2,01	8,02	2,42	3,60	6,25	2,37	3,55	2,59	5,19	5,27
Average	2,60	2,93	4,22	3,45	3,74	5,23	7,95	6,96	3,99	5,00	5,67	5,88	8,74	4,25	6,10	5,49	8,07	4,66	3,61	5,95	7,57	4,27	3,85	6,32	3,94	3,65

5.2.5.1.1.2 PROFILE JIHLAVA-KRAMOLÍN

Basic characteristic of water gauging profile Jihlava – Kramolín

river:	Jihlava	A	P_a	Q_a
hydrological code:	4-16-01-103	[km^2]	[mm]	[m^3/s]
watergaugingprofile:	Dalešice – dam Kramolín	1139,07	647	6,19

M-days flow rates at water gauging profile Jihlava – Kramolín

M	30	60	90	120	150	180	210	240	270	300	330	355	364
Q_M	13,6	9,15	7,13	6,75	4,72	3,94	3,37	2,92	2,50	2,14	1,75	1,26	0,84

N-years flow rates at water gauging profile Jihlava – Kramolín

N	1	2	5	10	20	50	100
Q_N	54,5	80,4	121,9	158,3	198,9	259,2	310,0

5.2.5.1.1.3 PROFILE JIHLAVA-MOHELNO

Basic characteristic of water gauging profile Jihlava – Mohelno

river:	Jihlava	A	P_a	Q_a
hydrological code:	4-16-01-105	[km^2]	[mm]	[m^3/s]
watergaugingprofile:	Mohelno dam	1155,26	646	5,351

M-days flow rates at profile Jihlava – Mohelno

M	30	60	90	120	150	180	210	240	270	300	330	355	364
Q_M	13,01	6,29	5,24	4,42	4,30	4,13	3,78	3,07	2,25	2,06	1,75	1,19	0,91

N-years flow rates at profile Jihlava – Mohelno

N	1	2	5	10	20	50	100
Q_N	26	38,5	61,3	83,4	110,1	152,9	191,5**

AVERAGE MONTH FLOW RATE (m^3/s) IN THE JIHLAVA RIVER – PROFILE MOHELNO

	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
January	2,04	1,38	4,49	2,11	5,56	1,18	8,35	4,03	4,54	4,53	3,15	2,18	6,65	12,56	2,82	3,01	3,48	2,69	5,05	1,89	4,55	13,01	2,55	2,56	2,53	11,37
February	1,75	1,38	7,42	2,16	5,04	1,56	8,28	5,54	4,25	8,45	12,27	3,11	11,01	6,16	10,32	4,39	3,83	4,53	5,87	1,84	9,13	6,73	5,33	9,47	2,50	5,31
March	1,88	1,01	12,39	3,46	7,10	2,47	5,37	14,28	4,33	18,05	18,57	4,54	9,93	6,08	10,88	14,32	7,77	9,33	8,69	19,72	9,41	6,55	9,02	10,36	2,29	3,88
April	2,08	0,97	6,53	5,64	7,76	5,58	26,07	9,80	4,36	4,24	13,35	9,96	6,71	6,21	12,44	7,76	36,49	5,35	5,61	9,24	11,35	4,79	4,42	8,89	2,30	4,92
May	1,92	1,08	3,62	3,68	3,58	5,33	21,67	5,80	4,02	4,22	4,66	5,89	4,79	4,40	6,94	4,33	9,62	2,27	3,82	1,80	6,63	3,28	3,54	6,21	2,14	2,85
June	2,14	1,56	2,72	2,24	3,51	6,86	6,27	4,23	3,37	2,70	4,06	3,23	3,73	4,09	5,02	3,80	7,17	1,77	2,30	3,57	13,44	2,26	2,37	14,07	2,01	2,12
July	2,00	2,06	1,87	1,93	2,29	3,84	4,69	15,78	3,43	3,21	2,39	3,80	3,17	3,05	4,03	4,55	4,58	2,06	2,13	10,49	3,71	2,01	2,10	4,53	1,57	1,50
August	1,81	4,12	1,52	2,41	2,28	3,68	4,49	5,44	2,42	2,05	2,08	5,04	13,49	2,77	3,26	3,90	8,76	2,06	2,12	4,44	9,23	2,12	2,12	2,03	1,50	1,39
September	1,49	2,06	1,32	1,65	2,31	4,00	4,75	3,39	1,60	2,22	2,11	5,77	8,19	2,37	2,21	4,58	4,24	2,86	2,03	4,06	7,94	2,27	2,08	2,29	3,17	1,25
October	1,67	1,95	1,37	1,55	2,23	3,97	5,09	4,43	1,77	2,24	2,05	5,85	8,73	2,21	2,93	4,42	3,38	4,12	2,17	2,87	9,58	3,32	2,01	2,51	6,40	1,56
November	1,56	2,00	1,41	1,00	2,23	4,24	10,13	4,18	2,93	3,15	2,21	6,10	21,00	2,17	5,62	3,84	3,26	5,13	2,00	3,37	5,64	3,52	1,77	2,52	4,37	2,00
December	1,49	2,13	1,72	2,37	1,38	4,27	4,60	4,39	3,39	2,92	2,13	6,08	9,29	1,93	3,96	3,26	3,28	5,32	1,93	3,23	5,74	2,22	1,77	2,62	5,58	2,83
Average	1,82	1,81	3,86	2,52	3,76	3,92	9,12	6,80	3,36	4,82	5,72	5,13	8,86	4,49	5,84	5,19	7,97	3,95	3,64	5,58	8,00	4,33	3,25	5,63	3,04	3,41

5.2.5.1.1.4 WATER RESERVOIR DALEŠICE AND MOHELNO

Water Reservoir	Flow rates [m³/s]			Volume of water [mil. m³]				Height of water level [m n.m.]		Length and height of dam [m]	
	Q_a	Q_{355}	Q_{364}	$V_{PROTECTION}$	$V_{STORAGE}$	$V_{PERMANENT}$	V_{TOTAL}	H_{MAX}	$H_{STORAGE}$	L_{DAM}	H
Dalešice	6,19	1,26	0,84	4,7	63,0	59,2	126,9	381,50	362,50 – 380,50	300,00	88,0
Mohelno	5,351	1,19	0,91	0,1	11,3	5,7	17,1	303,30	290,80 - 303,20	185,00	38,65

5.2.5.1.2 SKRYJSKÝ AND LUHY STREAM

Basic characteristic of Skryjský stream

stream:	Skryjský stream	A	P_a	Q_a
hydrological code:	4-16-01-104	[km²]	[mm]	[m³/s]
water gauging profile:	Above Luhy	2,56	491	0,0049

M-days flow rates Skryjský stream

M	30	60	90	120	150	180	210	240	270	300	330	355	364
Q_M[l/s]	11,0	7,0	5,1	4,0	3,2	2,7	2,2	1,9	1,6	1,4	1,2	0,7	0,2

N-years flow rates Skryjský stream

N	1	2	5	10	20	50	100
Q_N[m³/s]	0,66	0,97	1,7	2,7	4,0	6,7	9,5

Basic characteristic of Luhy

stream:	Luhy	A	P_a	Q_a
hydrological code:	4-16-01-104	[km²]	[mm]	[m³/s]
water gauging profile:	Above Skryjský stream	2,69	491	0,0052

M-days flow rates Luhy stream

M	30	60	90	120	150	180	210	240	270	300	330	355	364
Q_M[l/s]	12	7,4	5,4	4,2	3,4	2,8	2,4	2,0	1,7	1,5	1,3	0,8	0,3

N-years flow rates Luhy stream

N	1	2	5	10	20	50	100
Q_N[m³/s]	0,63	0,95	1,7	2,7	4,2	6,9	9,8

5.2.5.1.3 LIPŇANSKÝ STREAM

Basic characteristic of Lipňanský stream

stream:	Lipňanský stream	A	P_a	Q_a
hydrological code:	4-16-03-046	[km²]	[mm]	[m³/s]
water gauging profile:	Above Olešná river	2,13	510	0,0004

M-days flow rates Lipňanský stream

M	30	90	180	270	330	355	364
Q_M[m³/s]	0,010	0,005	0,0025	0,001	0,0005	0,0002	0,00005

N-years flow rates Lipňanský stream

N	1	2	5	10	20	50	100
Q_N[m³/s]	0,7	1,4	2,2	3,0	4,0	5,5	6,5

Water Reservoir	Flow rates [m³/s]		Volume of water [m³]				Height of water level [m n.m.]		Length and height of dam [m]	
	Q_{100}	Q_{50}	$V_{PROTECTION}$	$V_{STORAGE}$	$V_{PERMANENT}$	V_{TOTAL}	H_{MAX}	$H_{STORAGE}$	L_{DAM}	H
Horní	x	4,40	1 250	11 500	x	19 560	360,00	359,18	95	x
Dolní	5,50	x	400	2 230	x	4 030	354,7	354,00	58	x

5.2.5.1.4 OLEŠNÁ RIVER

Water Reservoir	Flow rates [m³/s]		Volume of water [m³]				Height of water level [m n.m.]		Length and height of dam [m]	
	Q_{100}	Q_{50}	$V_{PROTECTION}$	$V_{STORAGE}$	$V_{PERMANENT}$	V_{TOTAL}	H_{MAX}	$H_{STORAGE}$	L_{DAM}	H
Rouchovany	19	12,5	x	221 000	16 000	282 200	340,41	339,81	x	x

Water Reservoir	Flow rates [m³/s]		Volume of water [m³]				Height of water level [m n.m.]		Length and height of dam [m]	
	Q_{100}	Q_{50}	$V_{PROTECTION}$	$V_{STORAGE}$	$V_{PERMANENT}$	V_{TOTAL}	H_{MAX}	$H_{STORAGE}$	L_{DAM}	H
Kordula	21	14	x	x	4 000	x	x	x	x	x

5.2.5.1.5 HEŘMANICKÝ STREAM

Basic characteristic of Heřmanický stream

stream:	Heřmanický stream	A	P_a	Q_a
hydrological code:	4-16-03-046	[km²]	[mm]	[m³/s]
water gauging profile:	Above Olešna river	2,63	505	0,0005

M-days flow rates Heřmanický stream

M	30	90	180	270	330	355	364
Q_M[m³/s]	0,012	0,006	0,003	0,0015	0,0007	0,0003	0,0005

N-years flow rates Heřmanický stream

N	1	2	5	10	20	50	100
Q_N[m³/s]	0,9	1,5	2,5	3,5	4,5	6,0	7,5

5.2.5.2 INFORMATION ON WATER QUALITY

5.2.5.2.1 RAW WATER QUALITY

The source of the raw water is raw water from the Jihlava river, pumped from the Mohelno dam.

Raw water quality - average values for years 2011 - 2021.

	pH	Ca	Mg	$KNK_{4,5}$	Cl (mg/l)	SO_4^{2-} (mg/l)	N-NO_3 (mg/l)	BSK_5	$CHSK_{Cr}$	NL	P_{total}	RAS	VN	PO_4	N-NH_4
	-	mg/l	mg/l	mmol/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	mg/l	mg/l
2011	7,3	37,6	11,2	1,48	30	51,5	7	0,93	16,8	2,4	0,134	177,2	415,2	0,315	0,05
2012	7,6	38,3	11,3	1,66	36,2	54,7	6,2	0,8	16	2,7	0,133	200	450,7	0,319	0,067
2013	7,4	36,6	10,4	1,52	36,3	54,5	6,8	0,78	17,7	2,8	0,124	174,2	440,5	0,314	0,048
2014	7,7	39,6	12,5	1,78	39,3	58	6,13	0,83	16,7	3,1	0,142	192,5	484	0,397	0,059
2015	7,6	39,8	11,5	1,7	36,1	56,8	7,03	0,73	15,2	2,1	0,115	154,2	459,8	0,278	0,045
2016	7,5	42	12,1	1,77	40	64	7,3	0,8	13,4	1,9	0,11	193	495	0,311	0,06
2017	7,4	46	12,8	1,92	47,3	68,5	6,5	0,7	13,2	1,9	0,11	216	529	0,317	<0,07

	pH	Ca	Mg	$KNK_{4,5}$	Cl (mg/l)	SO_4^{2-} (mg/l)	$N\text{-}NO_3$ (mg/l)	BSK_5	$CHSK_{Cr}$	NL	P_{total}	RAS	VN	PO_4	$N\text{-}NH_4$
	-	mg/l	mg/l	mmol/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	mg/l	mg/l
2018	7,6	51	14,9	2,04	56	72	7,2	0,9	14,7	2,8	0,14	254	579	0,323	<0,06
2019	7,5	50	15,5	1,85	56	75	8,8	0,8	15,4	2	0,12	265	584	0,289	<0,06
2020	7,3	46	14,7	1,82	51	70,6	7,6	1,0	17,6	1,4	0,13	223	537	0,264	<0,04
2021	7,1	40	12,4	1,51	35	56,8	8,6	1,0	19,4	1,2	0,11	176	444	0,215	<0,05

5.2.5.2.2 WASTEWATER QUALITY

Existing Nuclear Power Plant* wastewater quality - average values for years 2011 – 2021.

	NL	RAS	SO_4^{2-}	Ca^{2+}	$N\text{-}NH_4^+$	$CHSK_{Cr}$	$C_{10\text{-}40}$	$N\text{-}NO_3^-$	N_{inorg}	P_{total}	BSK_5	Cl-	pH
	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	-
2011	5,6	513	145,7	97,2	0,125	36,8	<0,1	21,2	21,3	0,326	2,6	78	8,4
2012	8,44	530	149	94,4	0,102	36,3	<0,1	16,7	16,9	0,322	3,0	90,7	8,4
2013	10,6	554	157	97,7	0,113	41,4	<0,1	20,9	21,1	0,328	3,4	99,1	8,4
2014	9,3	536	158	98,3	0,142	40,1	<0,1	16,7	16,9	0,358	3,7	99,9	8,4
2015	8,7	503	163	93,7	0,174	37,7	<0,1	18,6	18,8	0,292	3,8	89,7	8,4
2016	5,1	522	173	96,9	0,09	32,2	<0,1	18,1	18,2	0,235	3,8	95,2	8,4
2017	4,7	504	155	93,8	0,09	26,9	<0,1	14,3	14,5	0,228	3,3	102,5	8,5
2018	2,8	565	164	97,2	0,09	28,4	<0,1	14,6	14,75	0,227	3,4	114,4	8,4
2019	3,0	603	179	102	0,07	29,5	<0,1	20,1	20,18	0,187	3,2	126	8,4
2020	3,9	600	206	101	0,05	36,9	<0,1	20,3	20,37	0,203	3,8	135	8,4
2021	3,7	555	180	104	0,09	40,7	<0,1	24,5	24,23	0,227	3,7	98	8,4

NL - Suspended solids
RAS - Dissolved inorganic salts
$CHSK_{Cr}$- Chemical oxygen demand
BSK_5 - Biochemical oxygen demand
KNK4,5 - alkalinity
VN – conductivity

5.2.6 GEOLOGICAL, HYDROGEOLOGICAL, GEOTECHNICAL, SEISMIC CONDITIONS

5.2.6.1 GEOLOGICAL SITE CONDITIONS

5.2.6.1.1 GEOLOGICAL CONDITIONS OF THE NEAR REGION

The Dukovany NPP is situated in the southeastern part of the Bohemian Massif, on the southeastern edge of the stable epi-Variscan platform. Near region of the Dukovany NPP cover up several regional geological units, namely the Moravian Moldanubicum (incl. Třebíč-Velké Meziříčí pluton), Moravicum (represented by the Svratka and Dyje dome) and Brunovistulicum. The Brunovistulicum is separated from previous units by the Boskovice furrow filled by the Permian-Carboniferous sediments.

The Boskovice furrow as well represents the major tectonic structure of the Dukovany NPP near region. It is long asymmetric furrow, where Marginal fault of the Boskovice furrow and Diendorf fault are bounding the furrow on its eastern side. The Býteš fault that separates

Moravian Moldanubicum and Svratka dome is another important tectonic structure of the Dukovany NPP near region.

The site vicinity is situated in the Moldanubian domain that there consists of high-grade rocks of the Gföhl unit structurally overlying generally lower-grade rocks of the Varied and Monotonous groups of the Moldanubicum.

The Gföhl unit is characterized with a great lithological heterogeneity and presence of bodies of high-pressure and high-temperature mantle-derived rocks, garnet and spinel peridotites, eclogites and skarns, enclosed as lenses or larger bodies inside various types of crust rocks - migmatized paragneisses, migmatites, ortogneisses and granulites, which are the prevailing rock types of this unit.

The Dukovany NPP is situated on the contact zone of Rokytná gneiss complex and Náměšť – Krumlov granulite massif. In geomorphological terms, this area represents a narrow element of peneplane that creates water-divide between Jihlava and Rokytná rivers. Both rivers are eroded down into a few tens of meters deep and narrow valleys.

The comprehensive study of the near region geology has been developed by the Owner* and this report is incorporated into the Initial Safety Analysis Report.

5.2.6.1.2 OVERALL CHARACTERIZATION OF THE CONSTRUCTION SITE

The objective of this chapter is to define the overall view to the Construction Site* based on results of preliminary geotechnical survey.

A. Distribution of the rock types

Geological structure of the rock mass is very variegated and changing of different rock types at a short distance is very frequent. Fortunately, variations of the petrography types have a low influence on behavior of foundation materials on the Construction Site*. Therefore, only two major types of rock are considered for geotechnical purposes - amphibolites (± migmatized amphibolites) and gneisses (± migmatites). These two groups of rock should be distinguished there. Predominant distribution of amphibolites and gneisses is depicted on the geological map of the Construction Site* (See drawings No. 505, 506, 507 included in Chapter 5.7 of Technical Requirements Document*).

B. Weathering of bedrock

Weathering of bedrock is very variable in both directions - horizontal and vertical on the Construction Site*. This is especially given by the structure of the rock mass, exactly by steep tilting of the metamorphic foliation (general azimuth 90° and tilt about 65° toward the South) and changing of rock types. Intensity of weathering is controlled after that by two main factors, by resistance of the rock against weathering and measure of cracking. Generally, silica rich rocks (as belted amphibolites or granulite gneisses) are more resistant against weathering than simple amphibolite or mica gneiss (See Chapter 5.8 and Geotechnical Database). Three areal units should be distinguished in term of weathering on the Construction Site*: 1) Evenly weathered areas, 2) unequally weathered areas and 3) weathered areas under Neogene sediments.

1) Evenly weathered areas

Completely and highly weathered rocks prevail over slightly weathered rocks there and zone of prevailing weathering reaches a depth of about 25 m under the ground. These areas are situated at the southern and southwestern part of the Construction Site* (See drawing No. 510 included in Chapter 5.7 of Technical Requirements Document*)

2) Unequally weathered areas
Completely and highly weathered rocks alternate with slightly weathered rocks there. Weathered parts create strips, sometimes only a few dm broad and they are interlain with beds of slightly weathered rocks. Weathered parts reach a depth of about 10 m under the ground. Such area is situated at the central part of the Construction Site*, in the area of mountain ridge (See drawing No. 510 included in Chapter 5.7 of Technical Requirements Document*).

3) Weathered areas under Neogene sediments
Completely and highly weathered rocks create layer about 10 m thick layer under Neogene sediments. Rocks are weathered evenly. Such area is situated at the northern part of the Construction Site* (See drawing No. 510 and 507 included in Chapter 5.7 of Technical Requirements Document*).

C. Geotechnical zoning of the Construction Site*
Besides zoning according to type of rock weathering, there was developed zoning according to representative geotechnical parameter. Based on geotechnical survey, the velocity of longitudinal waves (vP) was chosen as appropriate parameter. The result of this Construction Site* model is very close to previous model of weathering.

D. Tectonics of the Construction Site*
The Construction Site* is categorized by a planar structure - metamorphic foliation, generally of ENE-WSW direction with steep tilt about 65° toward the South. About 3 fracture systems occur there. The first one is conforming to metamorphic foliation; the second one is generally orthogonal to direction of the metamorphic foliation. The third system is conspicuous by a long, continuous and exactly vertical fractures (See drawings No. 502a and 502b, Chapter 5.7 of Technical Requirements Document*).

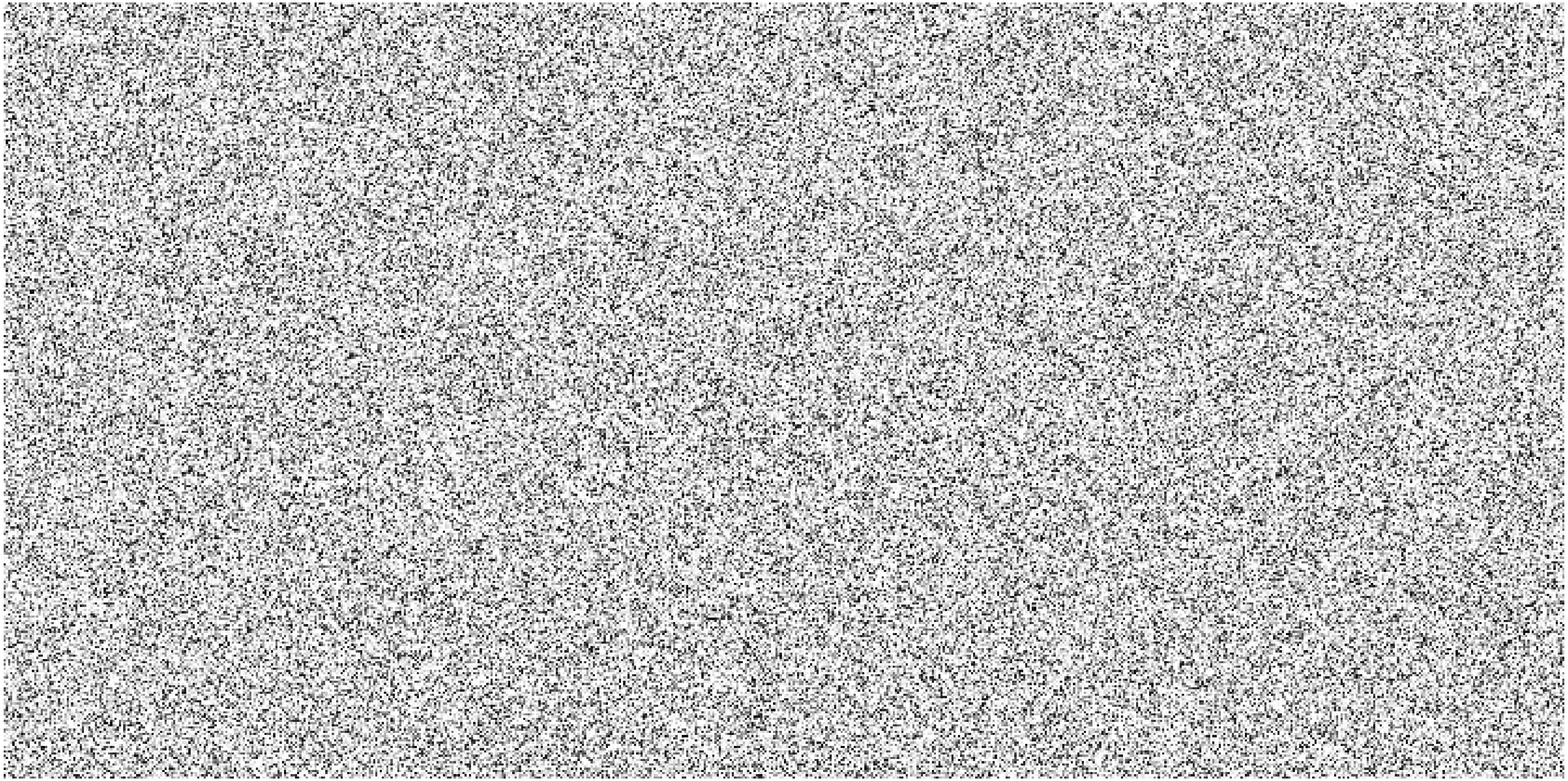
A failure zone was discovered in the central part of the Construction Site* and its azimuth/tilt is 3/77 W (NNE-SSW). Zone was exposed in the survey trench R-2. Toward the North is overlapped by the Neogenne sediments. Continuation of this zone toward the South did not confirm by the additional surveyes. Rocks of this zone are deeply and evenly weathered. Eastern margin of this zone is accompanied by a fault. The fault zone is about 0,5 m broad and consists of coherent cataclasites and tectonic breccias. No kinematic indicators, which can indicate young tectonic movement, were discovered by the paleo-seismological research of this fault.

5.2.6.1.3 FOUNDATION CONDITIONS

[redacted]

5.2.6.2 HYDROGEOLOGICAL CONDITIONS OF THE CONSTRUCTION SITE

[redacted]



5.2.6.3 GEOTECHNICAL SITE CONDITIONS

5.2.6.3.1 THE PROFILE OF THE SUBSURFACE MATERIALS

5.2.6.3.2 GEOTECHNICAL ASPECTS RELATING TO THE SEISMIC HAZARD ASSESSMENT

[redacted]

5.2.6.3.3 SURFACE FAULTING HAZARD

[redacted]

5.2.6.3.4 LANDSLIDE HAZARD

[redacted]

5.2.6.3.5 GROUND COLLAPSE OR DEFORMATION HAZARD

[redacted]

5.2.6.3.6 UNFAVORABLE FOUNDATION CONDITIONS

[redacted]

5.2.6.3.7 GEOTECHNICAL DATABASE

[redacted]

5.2.6.4 SEISMIC SITE CONDITIONS

5.2.6.4.1 SEISMIC HAZARD

5.2.7 RADIATION SITUATION AT SITE

[redacted]

5.2.7.1 MONITORING OF DISCHARGES PROGRAMME

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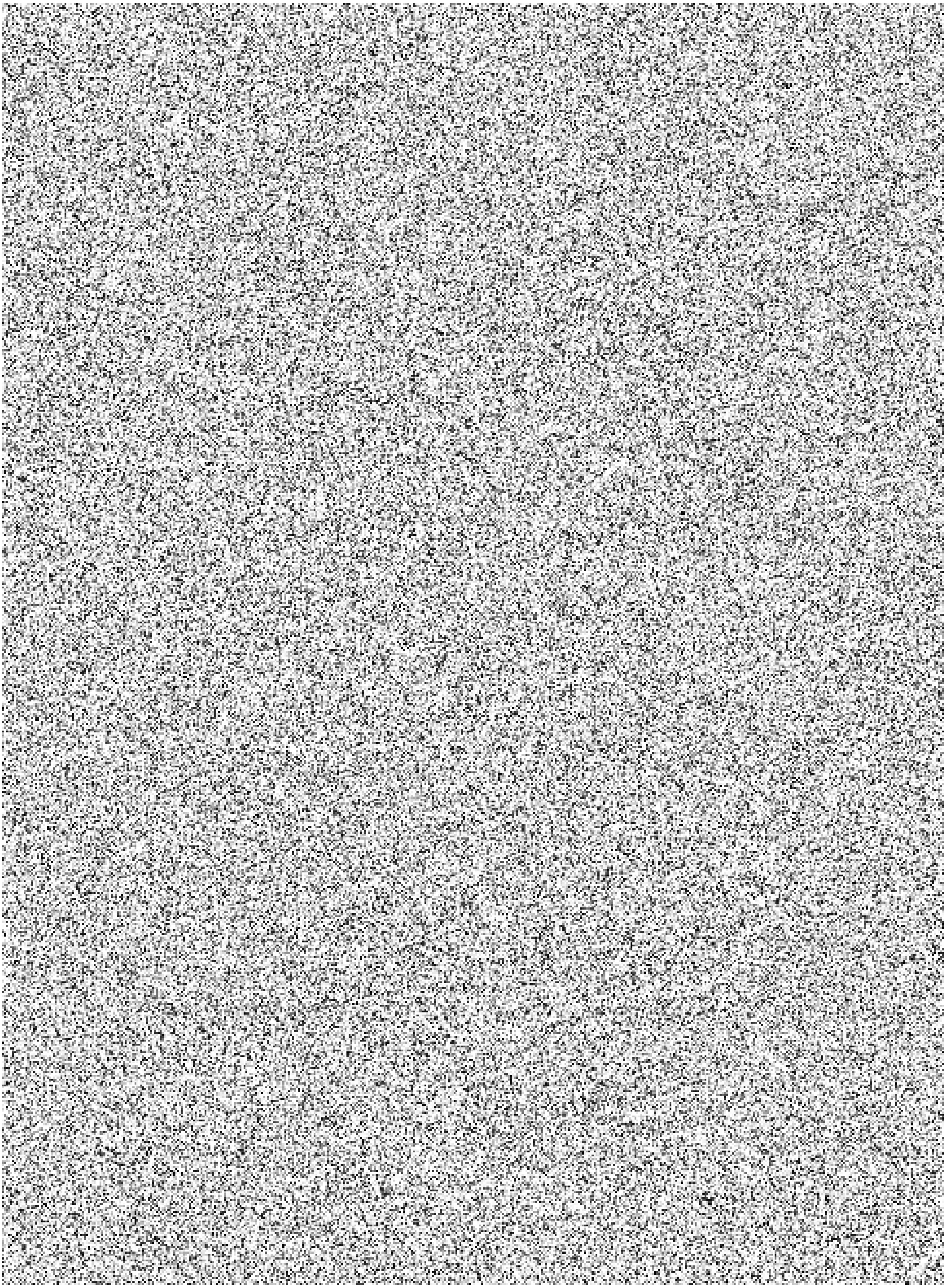
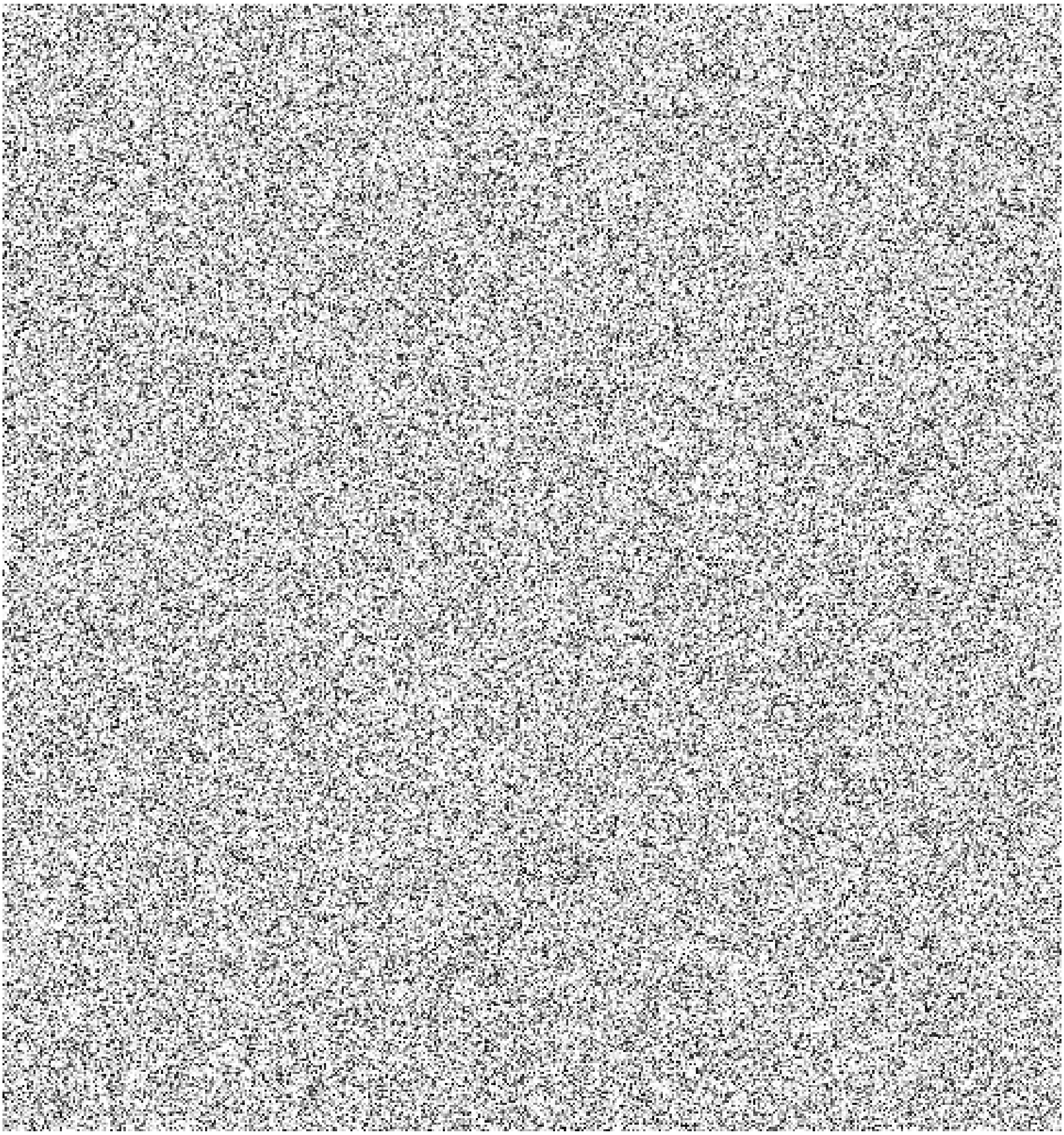




5.2.7.2 ENVIRONMENTAL MONITORING PROGRAMME

For a comprehensive monitoring and evaluation of the radiation situation in the locality the Environmental Radiation Monitoring Laboratory was set up in the Moravský Krumlov. This laboratory provides fullfilment of these following activities:

- sampling and evaluation of the radioactive discharges
- calculation of committed effective dose E(50) to the Representative Person* (see tab. 5.2.7.4-1 and 5.2.7.4-2)
- sampling and evaluation of various types of environment (water, crops, sediments etc.)

- participate in the Radiation Monitoring Network of the Czech Republic using 27 probes of the I. circuit of the teledosimetric system inside the Limited Access Area*, 8 probes of the II. circuit of the teledosimetric system (6 of them in nearest villages), ATDS (see below) and thermoluminescent dosimeters
- operation of the mobile groups that are mapping the radiation situation based on ground and aerial monitoring of the dose rate and surface contamination
- operation of teledozimetric system (mainly the outer circuits) for early identification of accident releases
- radiation data transfer to SÚJB etc.

Environmental monitoring of surrounding areas including measurement laboratory for this purpose shall be provided by the Owner*, see Licensing and Permitting, Safety and Quality Document*, Section 2.6.

By using of sampling, radiation control stations, the thermoluminescent dosimeters etc. presence of radioactive substances are measured and assessed in this manner:

- Atmospheric fallout
  Atmospheric fallout is sampled in all six fixed stations according to the approved monitoring programme to cover prevailing wind directions. In fallout the presence of fission and activation products is monitored by semiconductor-based gamma spectrometry.

- Aerosols and radioiodine gas
  Aerosols and gaseous I-131 is sampled in all six fixed dosimetric stations according to the approved monitoring programme to cover prevailing wind directions. In aerosols the presence of fission and activation products is monitored by semiconductor-based gamma spectrometry.

- Rainwater
  Rainwater is sampled in all six fixed dosimetric stations and meteorological station in Dukovany according to the approved monitoring programme to cover prevailing wind directions. In rainwater the presence of tritium is monitored by liquid scintillation spectrometry of beta radiation.

- Surface water
  Surface water is sampled from the Jihlava River in selected profiles, which are affected by the liquid effluents from the Existing Nuclear Power Plant*, according to the approved monitoring programme. Furthermore surface water is sampled from watercourses unaffected by liquid effluents. In samples the presence of tritium is monitored by liquid scintillation spectrometry of beta radiation, the presence of fission and activation products is monitored by semiconductor-based gamma spectrometry and presence of strontium is monitored by beta spectrometry. In the surface water a slightly increased amount of tritium was found for the whole period of observation.

- Drinking water
  Drinking water is sampled from wells located near the Jihlava river, which are affected by the liquid effluents from the Existing Nuclear Power Plant*, according to the approved monitoring programme. Furthermore the drinking water is sampled from unaffected wells. In the drinking water the presence of tritium is monitored by liquid scintillation spectrometry of beta radiation, the presence of fission and activation

products is monitored by semiconductor-based gamma spectrometry and presence of strontium is monitored by beta spectrometry. A slightly increased amount of tritium was found in the drinking waters for the whole period of observation.

- Groundwater
  Groundwater is sampled from drill holes (in area of the Existing Nuclear Power Plant*, nearby radioactive waste repository, nearby interim spent fuel storage and also in Site* vicinity) at time intervals according to the approved monitoring programme. In the groundwater the presence of tritium is monitored by liquid scintillation spectrometry of beta radiation, the presence of fission and activation products is monitored by semiconductor-based gamma spectrometry and presence of strontium is monitored by beta spectrometry. A slightly increased amount of tritium was found in the groundwater for the whole period of observation.

- Milk
  Milk is sampled from farms in the site vicinity according to the approved monitoring programme. In the milk the presence of activation and fission products is monitored by semiconductor-based gamma spectrometry and presence of strontium is monitored by beta spectrometry.

- Gamma dose equivalent rate monitoring
  Values of gamma dose equivalent rate are continuously measured at selected places of site vicinity by thermoluminescent dosimeters at time intervals according to the approved monitoring programme.

- Field gamma spectrometry
  Values of surface gamma activity of artificial radionuclides are continuously measured at selected places of site vicinity by field gamma spectrometry at time intervals according to the approved monitoring programme.

- Agricultural crops
  Agricultural crops are sampled at specified places of site vicinity at time intervals according to the approved monitoring programme. In the samples the presence of activation and fission products is monitored by semiconductor-based gamma spectrometry and presence of strontium is monitored by beta spectrometry.

- Fish
  Fish were sampled in the years 1984-2002 and thereafter in the years 2011 to the present at specified places of site vicinity at time intervals according to the approved monitoring programme. In the samples the presence of activation and fission products is monitored by semiconductor-based gamma spectrometry.

- Sediments
  Sediments are sampled at specified places of site vicinity at time intervals according to the approved monitoring programme. In the samples the presence of activation and fission products is monitored by semiconductor-based gamma spectrometry.

- Soil
  Soil is sampled at specified places of site vicinity at time intervals according to the approved monitoring programme. In the samples the presence of activation and fission products is monitored by semiconductor-based gamma spectrometry.

No burden requiring any corrective measures or regulatory action caused by the Existing Nuclear Power Plant* for the entire period 1984 - 2019 was registered. The most significant effect of the Existing Nuclear Power Plant* on environment is tritium contamination in groundwater, surface and drinking water. It is expected that the Plant* will also cause similar effects, therefore tritium discharges and releases should be carefully assessed and minimized as low as possible.

5.2.7.3 TELEDOSIMETRIC SYSTEM (TDS)

The teledosimetric system includes measuring probes, data connections and software for continuous monitoring of a gamma dose equivalent rate, thereby finding and transmitting information to the operator about a possible release of radioactive substances, their rate and direction. The TDS stations are usually located at a level of approx. 2.5 m above the surrounding terrain and are freely accessible to the surrounding air so that the system can immediately respond to the presence of radionuclides in the atmosphere. Measured data are automatically transmitted every minute to the central information radiation monitor system and measurement laboratory (LRKO) in digital form where they are evaluated.

TDS consists of two circuits - TDS I and TDS II, furthermore, the alternative teledosimetric system (ATDS or TDS III) is present in Existing Nuclear Power Plant* surroundings. The TDS I circuit includes 27 stations located within the Existing Nuclear Power Plant* Limited Access Area*. The stations are distributed in an approximate oval shape so that measurements can cover the entire area and at the same time, so that the stations are not shaded e.g. by buildings. The TDS I circuit is powered from its own switching station and has category III/I critical loads, i.e., they have an secured power supply, even in case of an emergency situation.

The TDS II circuit includes 7 stations situated in the nearest surrounding settlements, and 1 station in the area of the LRKO in Moravský Krumlov. The TDS II power supply is provided from the switching stations near the station buildings. In case of failure of the network power supply, the unit is able to ensure operation of a respective station for approx. 2 hours. The TDS II circuit stations are situated in the following villages: Mohelno, Horní Dubňany, Kordula, Slavětice, Dukovany, Rešice, Rouchovany, and Moravský Krumlov.

A new alternative teledosimetric system (ATDS), which ensures alternative monitoring of a radiation situation in the Existing Nuclear Power Plant* and its surroundings, was built in 2016.

It includes:

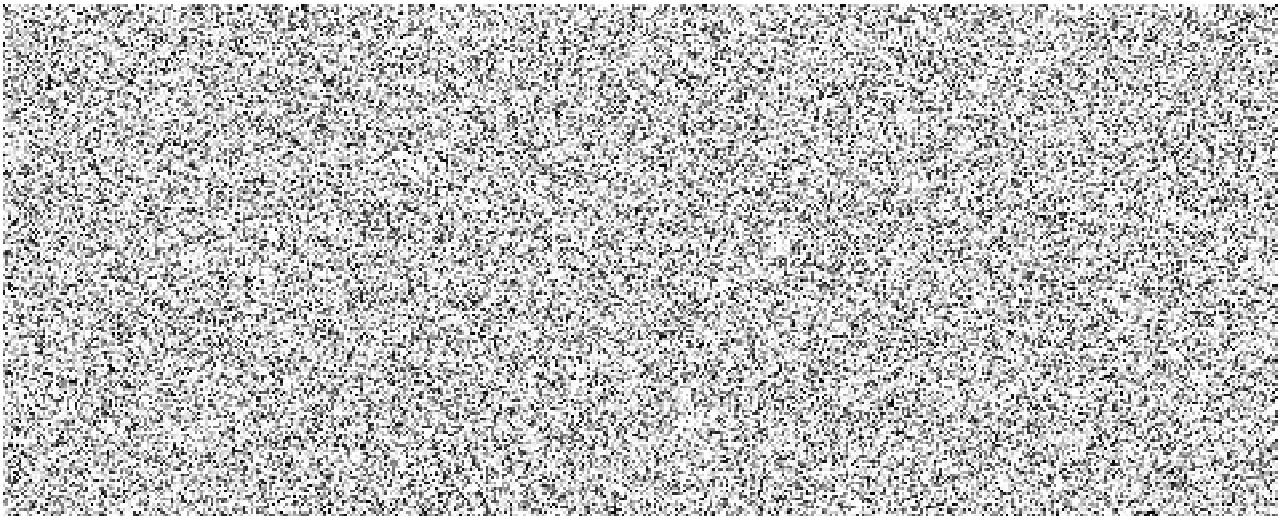
- export detectors of dose rate with radio transmission (6 pcs) for distribution in the locality,
- portable detectors of dose rate with radio transmission (8 pcs) for monitoring during activity of rescue units and monitoring groups in the Existing Nuclear Power Plant* surroundings.
- stationary and mobile meteorological stations with dose rate detectors,
- stationary detectors of the ATDS system in the surrounding villages, distributed uniformly in 16 zones in ZHP.

Stationary detectors of the ATDS circuit are situated in nearest villages. The export detectors and the ATDS system detectors are powered by (long-life) batteries, i.e., they are independent of external power supplies. The basic period of data transmission is 1 hour, this period shall automatically decrease to 10 minutes in case of an increase of the dose rate above the prescribed limit. The measured data is displayed in information system of radiation control and available in the radiation control room, in the backup control rooms in the emergency control centre and the backup emergency centre.

It is expected, that the Plant* shall have similar TDS inner circuit situated in the Limited Access Area* of the Plant* compatible with TDSII and ATDS circuits of the Existing Nuclear Power Plant*.

5.2.7.4 EXPOSURE OF REPRESENTATIVE PERSON

[redacted]



5.2.8 EMERGENCY PREPAREDNESS AT THE SITE

Czech Republic has established a crisis management system, which includes a system of (radiation) emergency preparedness, established by the Czech Atomic Act* (no. 263/2016 Coll.) In this Act an emergency preparedness, internal and external emergency plans, emergency planning zones, responsibilities of a permission holder (i.e. the operator of nuclear power plant) for emergency preparedness and in case of a radiation accident are defined. The Czech Atomic Act* also states:

- The State Office for Nuclear Safety (SÚJB) approves the so-called Internal Emergency Plan and its amendments.
- In case of a radiation incident, eventually a radiation accident, permission holder (licensee) must notify SÚJB and locally relevant Authorities* and transmit to SÚJB specified data and information.
- The SÚJB manages the radiation monitoring network. Using the network and evaluation of the radiation situation provides data for a decision on the introduction of measures to reduce or avert an exposure in case of a radiation accident.

The term emergency preparedness (according to Decree No. 359/2016 Coll. called "radiation extraordinary event management") stands for:

1) providing analysis and evaluation of radiological abnormal occurrence, this analysis shall assess radiological impact of abnormal occurrence,
2) preparedness to respond to radiological abnormal occurrence,
3) response to radiological abnormal occurrence and
4) recovery the state after abnormal occurrence.

Management of response to radiological abnormal occurrence is divided mainly among operator, relevant fire and rescue service and other emergency and rescue services. Responsibilities on response are mainly defined in emergency plans which serve as basic document to manage such situations.

The emergency plans are for the purpose of better management divided as follows:

- The internal emergency plan – for purpose of emergency planning inside the Existing Nuclear Power Plant* area (see term nuclear installation grounds stated in Czech Atomic Act*, §4, j)

- The external emergency plan – for purpose of emergency planning outside the Existing Nuclear Power Plant* area but inside the emergency planning zone
- The national radiation emergency plan – for purpose of emergency planning outside the Existing Nuclear Power Plant* emergency planning zone throughout the whole state

The abnormal occurrence means in the case of the emergency planning "harmful effects of forces and phenomena caused by human activity, natural causes and accidents that threaten life, health, property or the environment and requiring rescue and relief work." In case of nuclear power plants, the abnormal occurrence is important to its safety, which ultimately can lead to a threat of nuclear, radiation, fire, physical, technical or environmental safety of nuclear power plants or personnel security. All nuclear facilities in Czech Republic have to fulfill emergency preparedness under special legislation (Decree No. 359/2016 Coll.). The emergency preparedness system for nuclear power plants involves all parts of the integrated rescue system. This system also precisely defines and declares all their powers and responsibilities. Part of the emergency preparedness system is the nationwide Radiation Monitoring Network (RMN), which was established in April 1986. This network is managed by SÚJB. The Ministry of Finance, Defense, Agriculture and Environment and Ministry of the Interior participate in this network. The data obtained from the RMN are published regularly on the SÚJB website. The basic part of RMN is Early Warning Network (EWN), which is used to quickly detect deviations from a normal radiation situation, whether their cause is triggered by events in the Czech Republic or elsewhere. EWN measuring points are equipped with dose rate detectors, with continuous recording and data transmission. Parts of the EWN are teledosimetry systems located in the vicinity of the Existing Nuclear Power Plant*.

To reduce the exposure of persons during radiation accidents the emergency plans include, among other, so-called protective measures, which are specified in Decree No. 422/2016 Coll. as amended:

- **urgent protective measures** – sheltering persons, iodine prophylaxis, evacuation
- **follow-up protective measures** - resettlement, regulation of consumption of food and water, which is contaminated by radionuclides and regulation of using contaminated fodder

The emergency planning zone (EPZ) of the Existing Nuclear Power Plant* was established to ensure the implementation of urgent protective measures in accordance with the Decree No. 359/2016 Coll. Dukovany EPZ is divided into three concentric circle zones with radius of 5, 10 and 20 km. The two external zones are divided to 16 circular arcs of 22.5 degrees so that the axes of these arcs correspond to directions of the wind starting from 0 degrees. Approximately 100,000 inhabitants live in this EPZ. During the current operation of the Existing Nuclear Power Plant* this number almost did not change (verified by census on 31/12/2010).

The protective measures during radiation accidents are performed whenever they are justified by greater benefit than the cost of the action and damages caused by them. Averted doses, as a scale for implementation of the protective measures, are set in Decree No. 422/2016 Coll. The protective measures must be optimized in form, scope and duration in order to bring as much as reasonably achievable benefits.

In case of declaration of the evacuation (after sheltering in shelters), the Existing Nuclear Power Plant* personnel are evacuated by the main or the backup Limited Access Area* entrance by evacuation buses using specific routes (see figure 5.2.8-1):

- Route 1: 2nd class road number 152 and 351 from the Existing Nuclear Power Plant* through Slavětice, Dalešice, Valeč, Třebenice,
- Route 2: 2nd class road number 152 and 394 from the Existing Nuclear Power Plant* through Jamolice, Polánka, Ivančice, Neslovice, Tetčice to Střelice

Route selection is based on assessment of current meteorological and radiological situation. Number of persons in the Limited Access Area* of the Existing Nuclear Power Plant* is typically between 1 200 – 1 800 people in the main working hours. During outages this number can in short-term exceed 2 000. Even this short-term increase has no significant effect on the transport capacity of 2nd class roads, which connect Site* area to the road network.

The Internal Emergency Plan:
This emergency plan contains a set of planned measures to recognize, suppress and eliminate the consequences of possible abnormal occurrences and describes in particular the creation of technical-organizational and personnel conditions for determination of formation of the abnormal occurrence. Moreover, this plan describes management and implementation of interventions, methods to limit exposure of employees and other persons. The author of the Internal Emergency Plan is the licensee (operator of the plant). In case of radiation accident (the highest level that have effects beyond the plant), the licensee primary measure is notification of relevant regional authorities and municipalities with extended powers and warn the population throughout the emergency planning zone. The warning of population is ensured by sounders followed by radio and television broadcasting. Subsequently, recommendations on preparing for the evacuation of people living in the inner part of the 10 km emergency planning zone are issued.
It is expected that the Plant* will have its own Internal Emergency Plan.

The External Emergency Plan:
The External Emergency Plan follows the Internal Emergency Plan and it is applied throughout the emergency planning zone, which was established by decision of SÚJB, as a surface area of 20 km radius centered inside the area of the Existing Nuclear Power Plant* (see fig. 5.2.8-1). Implementation of protective measures in the emergency planning zone is being considered in cases where the made forecasts of radiological impacts and monitoring results indicate that part of the population may exceed the exposure guideline values established by Decree No. 422/2016 Coll. The author of the External Emergency Plan is Fire and Rescue Service of region Vysočina. The first plan is stored on the Vysočina Regional Office and the second copy is stored on operating and information center of the Fire and Rescue Service.
It is expected that the External emergency Plan will be common for every nuclear facility on Site* (ie. The Existing Nuclear Power Plant*).

The National Radiation Emergency Plan:
The National Radiation Emergency Plan follows The External Emergency Plan. This plan is the basic document of the Czech Republic to deal with radiation emergency situations and is intended for planning and management operations of integrated rescue system. In addition, this plan is a binding document for all municipalities, administrative offices, both natural and legal persons located in the region. The author of the plan is SÚJB. The content of the National Radiation Emergency plan are information and operational data, specific action plans, maps, diagrams, lists of forces and equipment to help, their deployment methods and principles of effective implementation of the rescue and relief works.

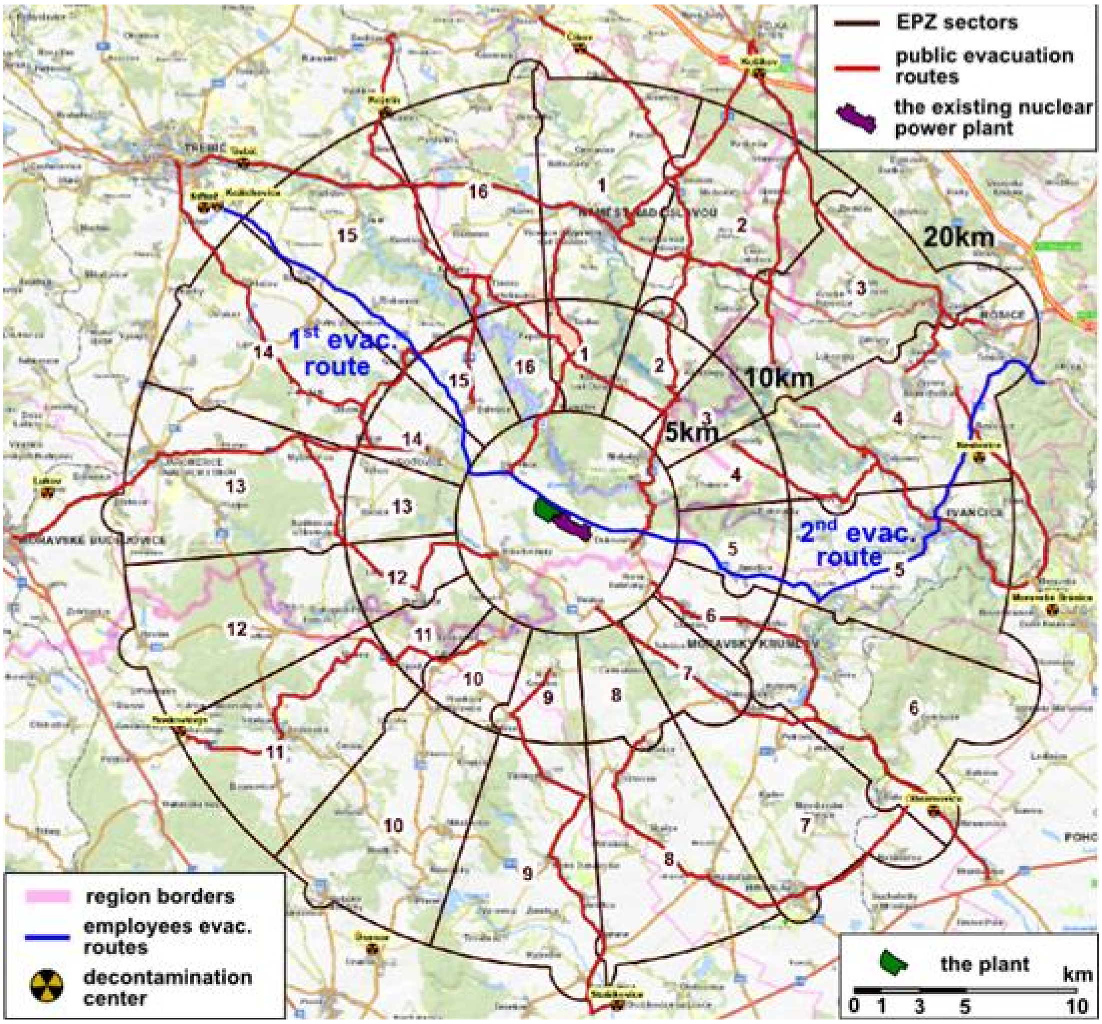
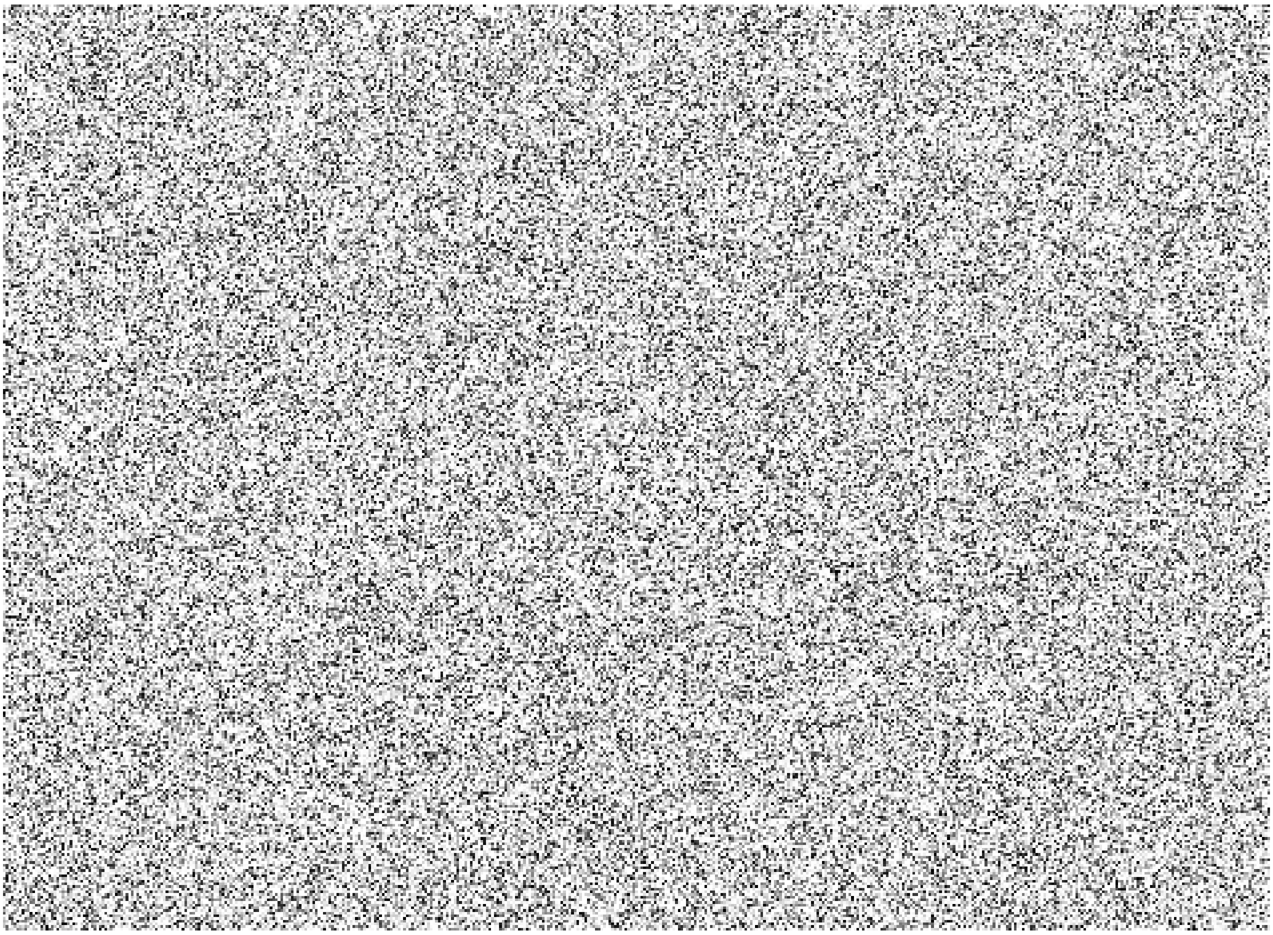


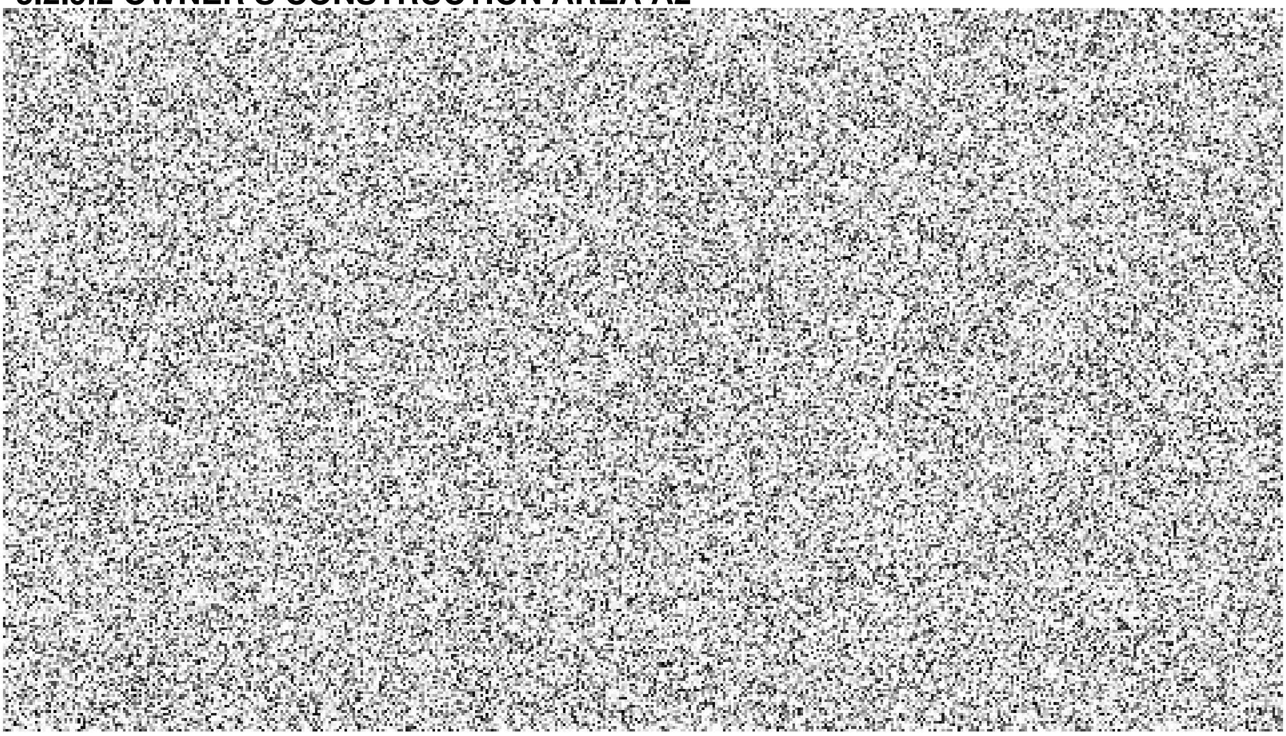
Fig. 5.2.8-1: Emergency planning zone of the Existing Nuclear Power Plant*.

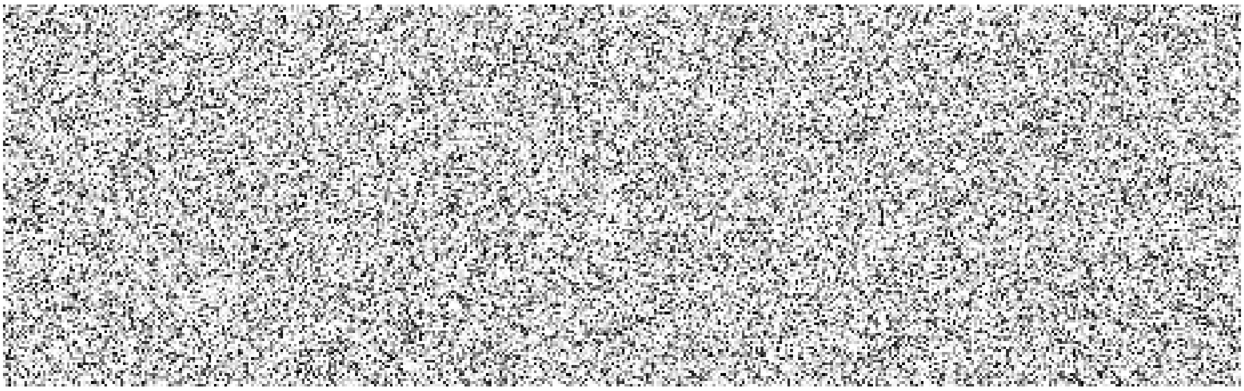
5.2.9 CONSTRUCTION AREAS

5.2.9.1 CONSTRUCTION AREA A1

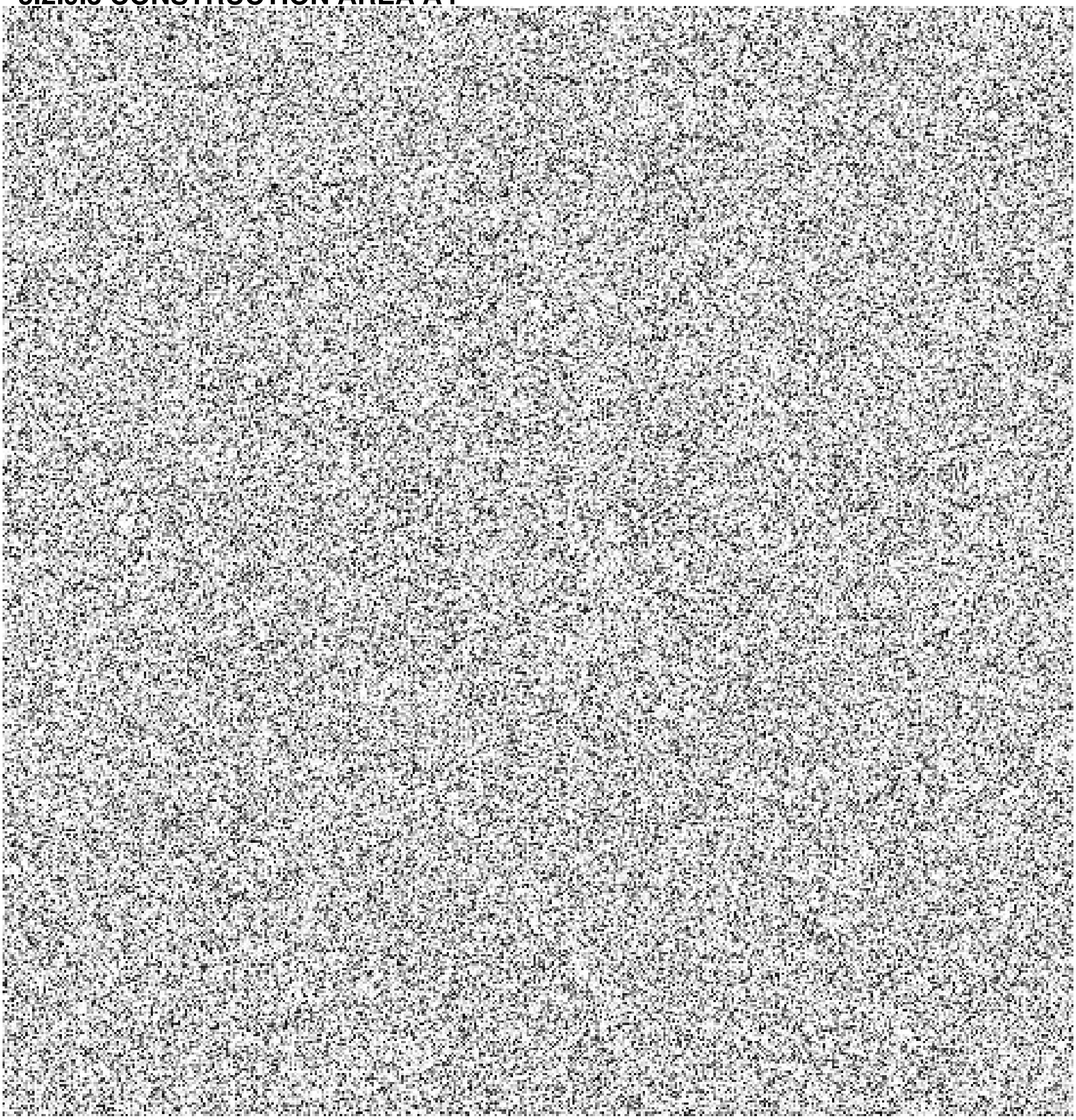


5.2.9.2 OWNER'S CONSTRUCTION AREA A2

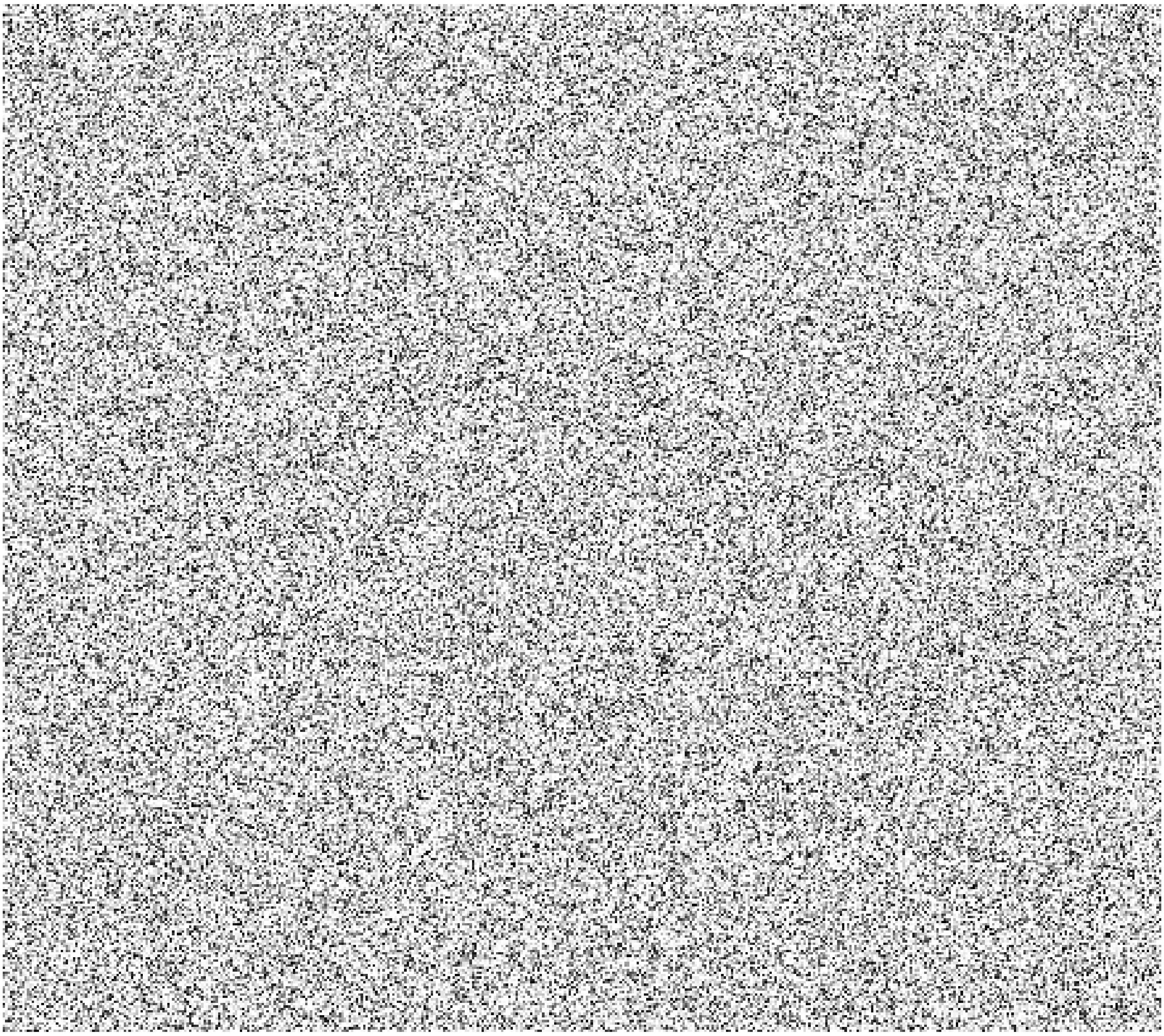




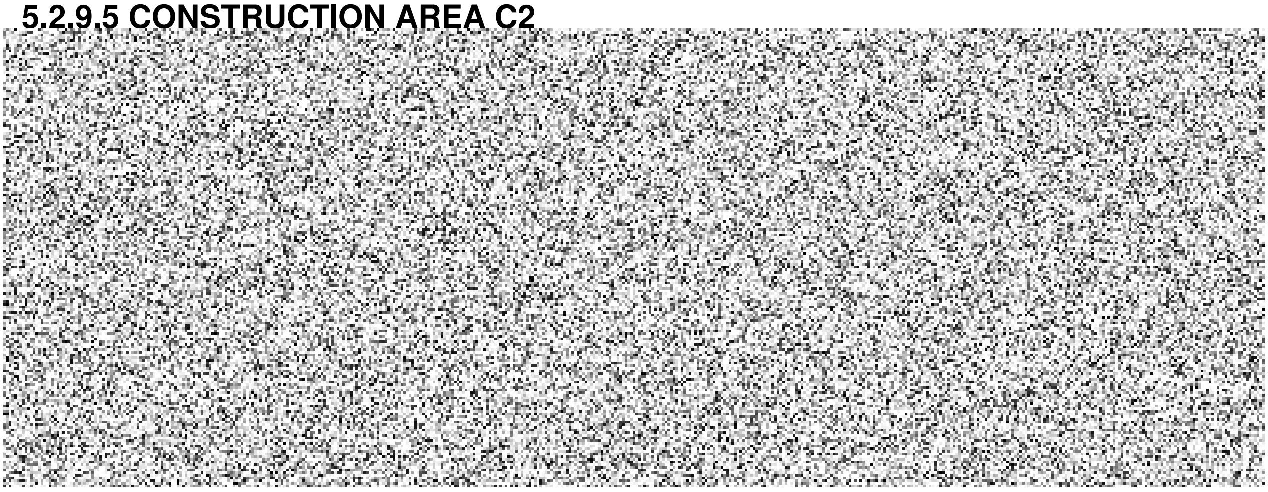
5.2.9.3 CONSTRUCTION AREA A4

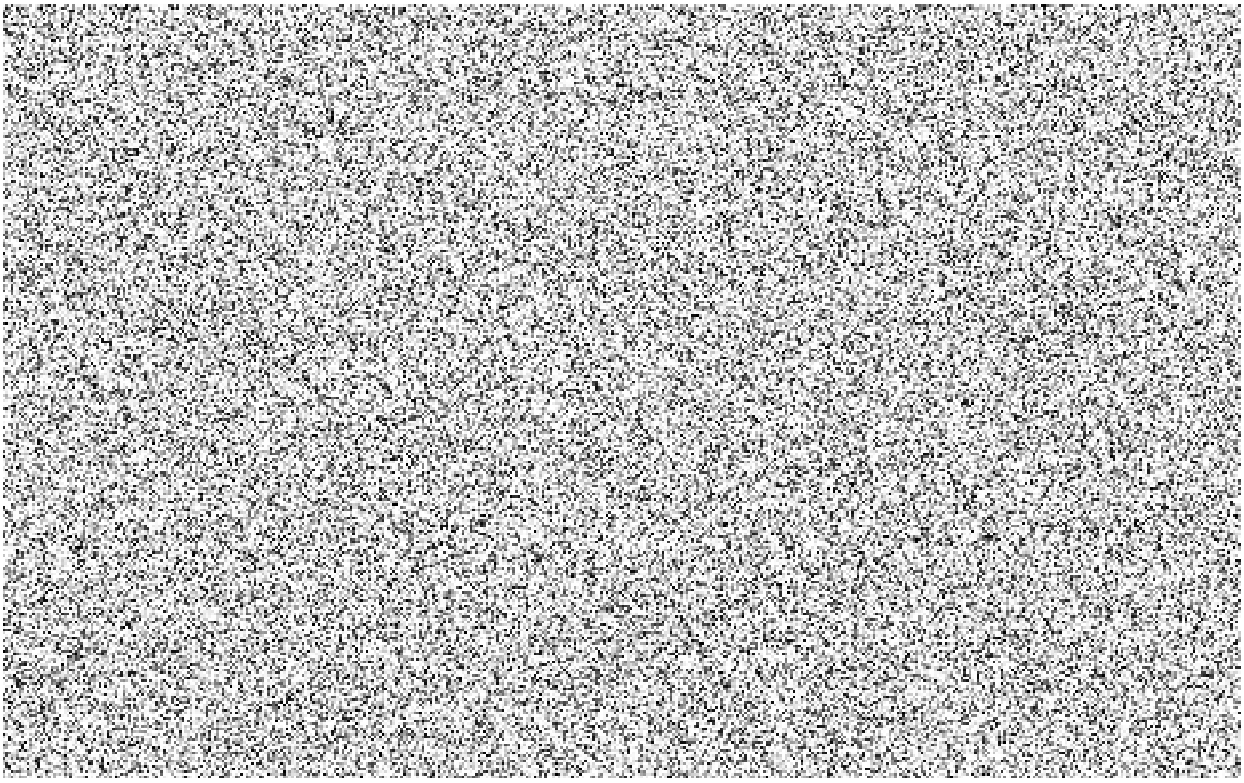


5.2.9.4 CONSTRUCTION AREA C1

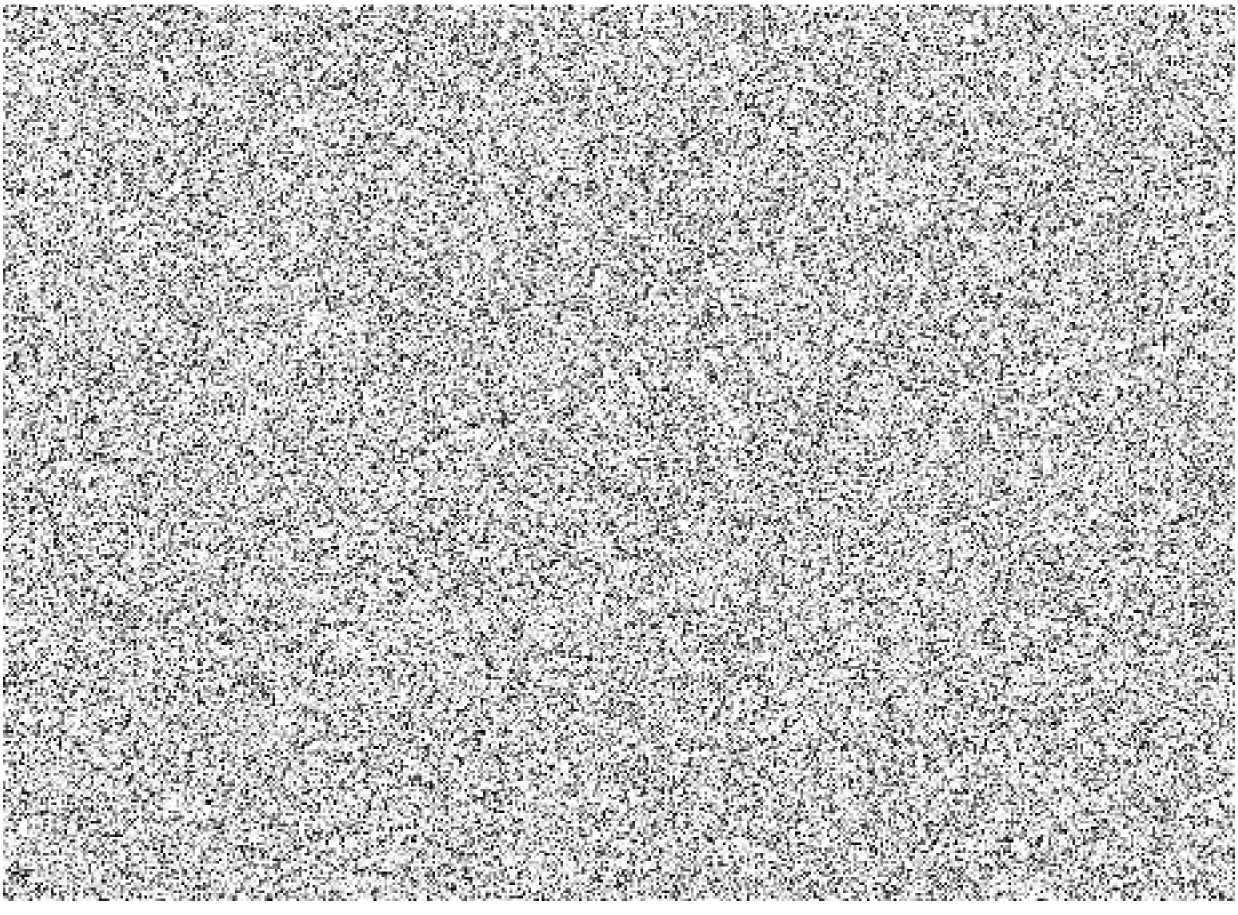


5.2.9.5 CONSTRUCTION AREA C2

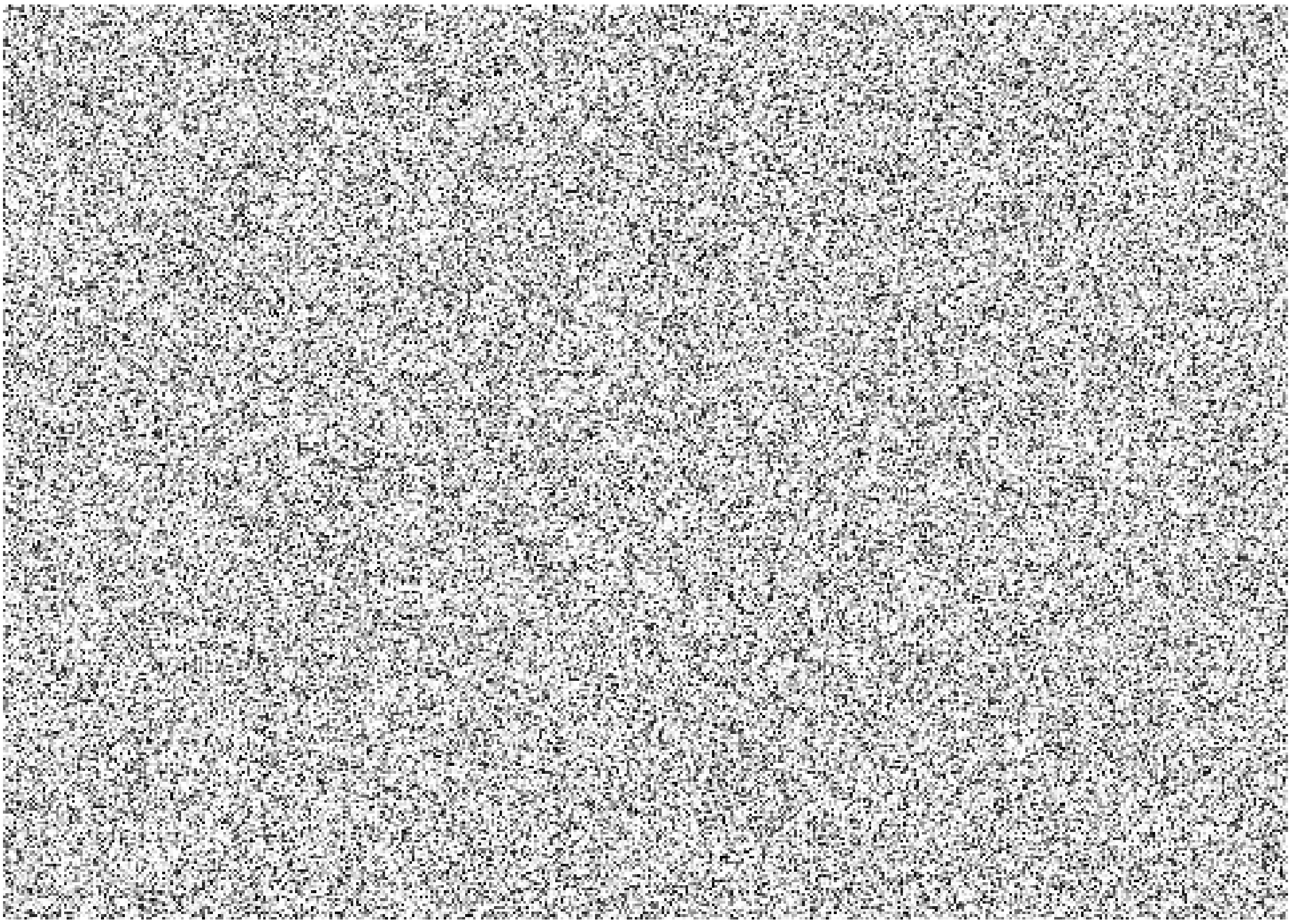




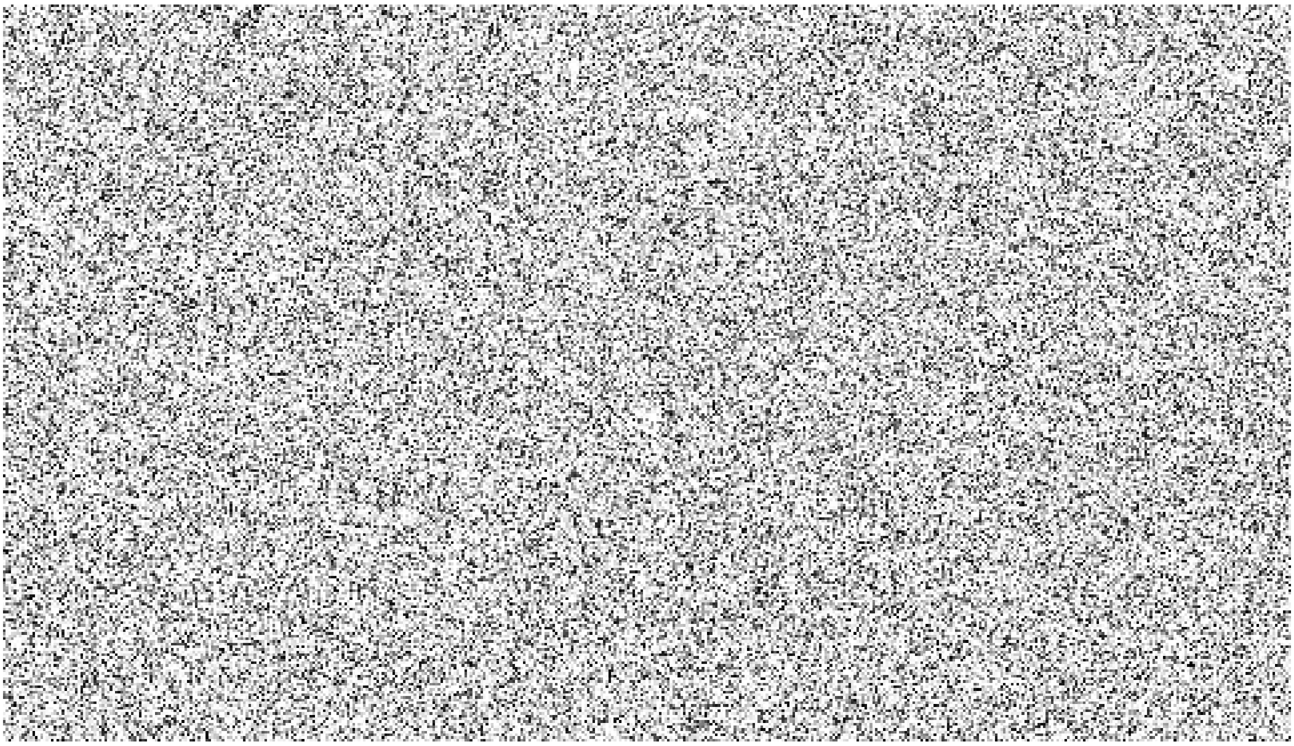
5.2.9.6 CONSTRUCTION AREA D1

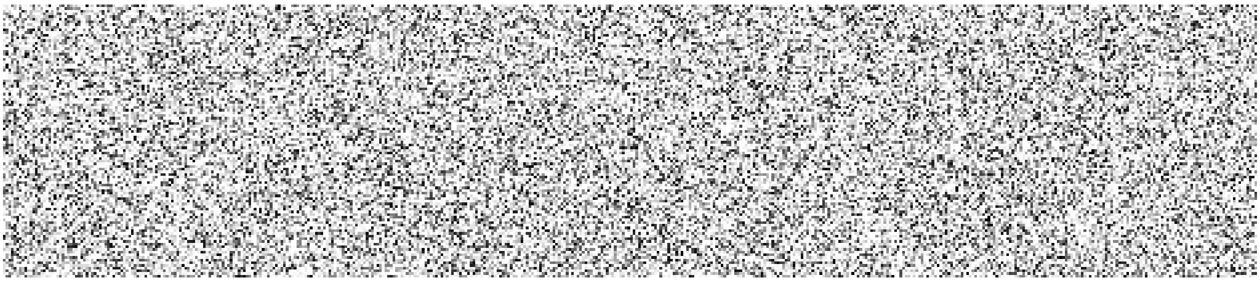


5.2.9.7 CONSTRUCTION AREA D2

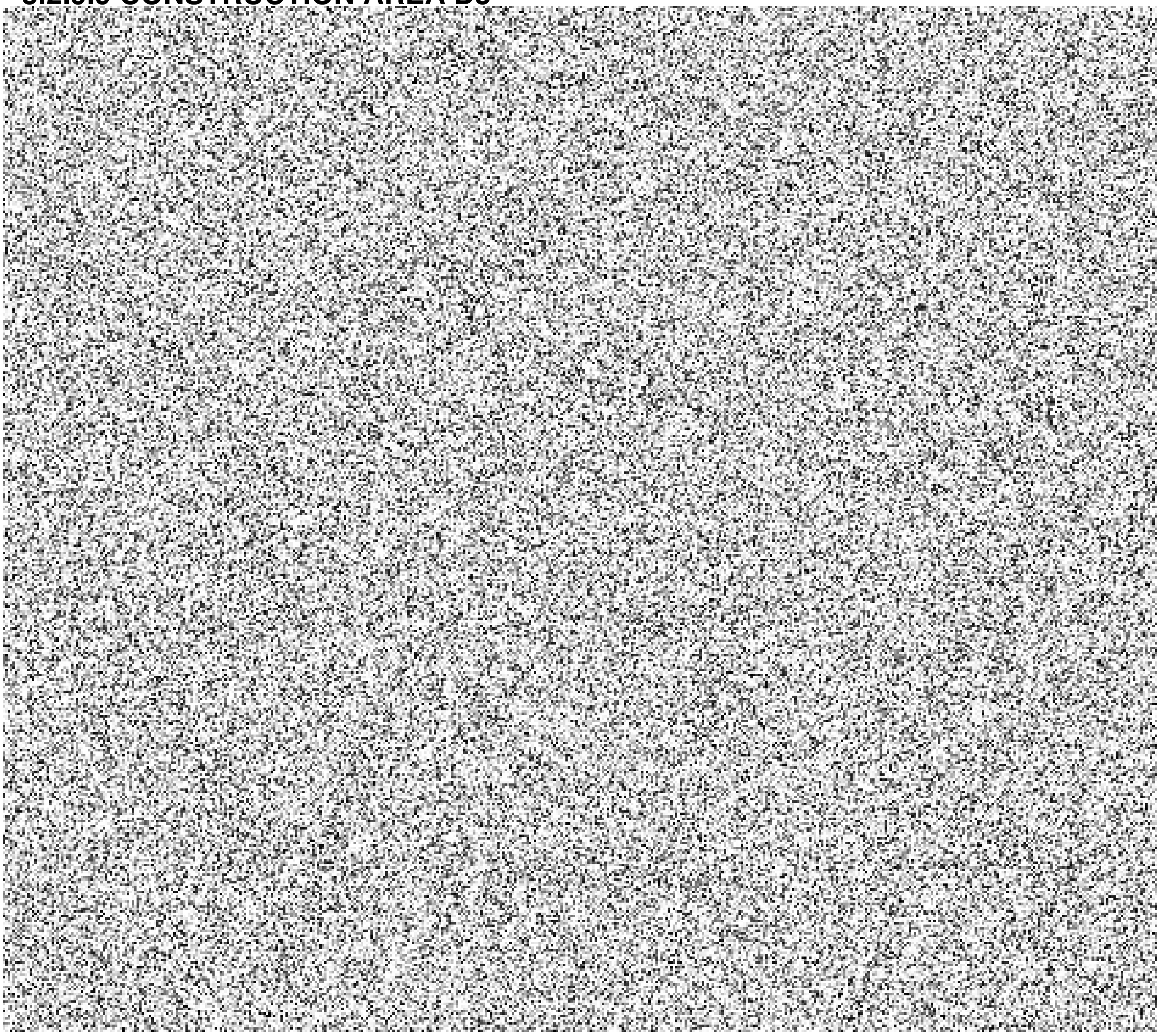


5.2.9.8 CONSTRUCTION AREA D3



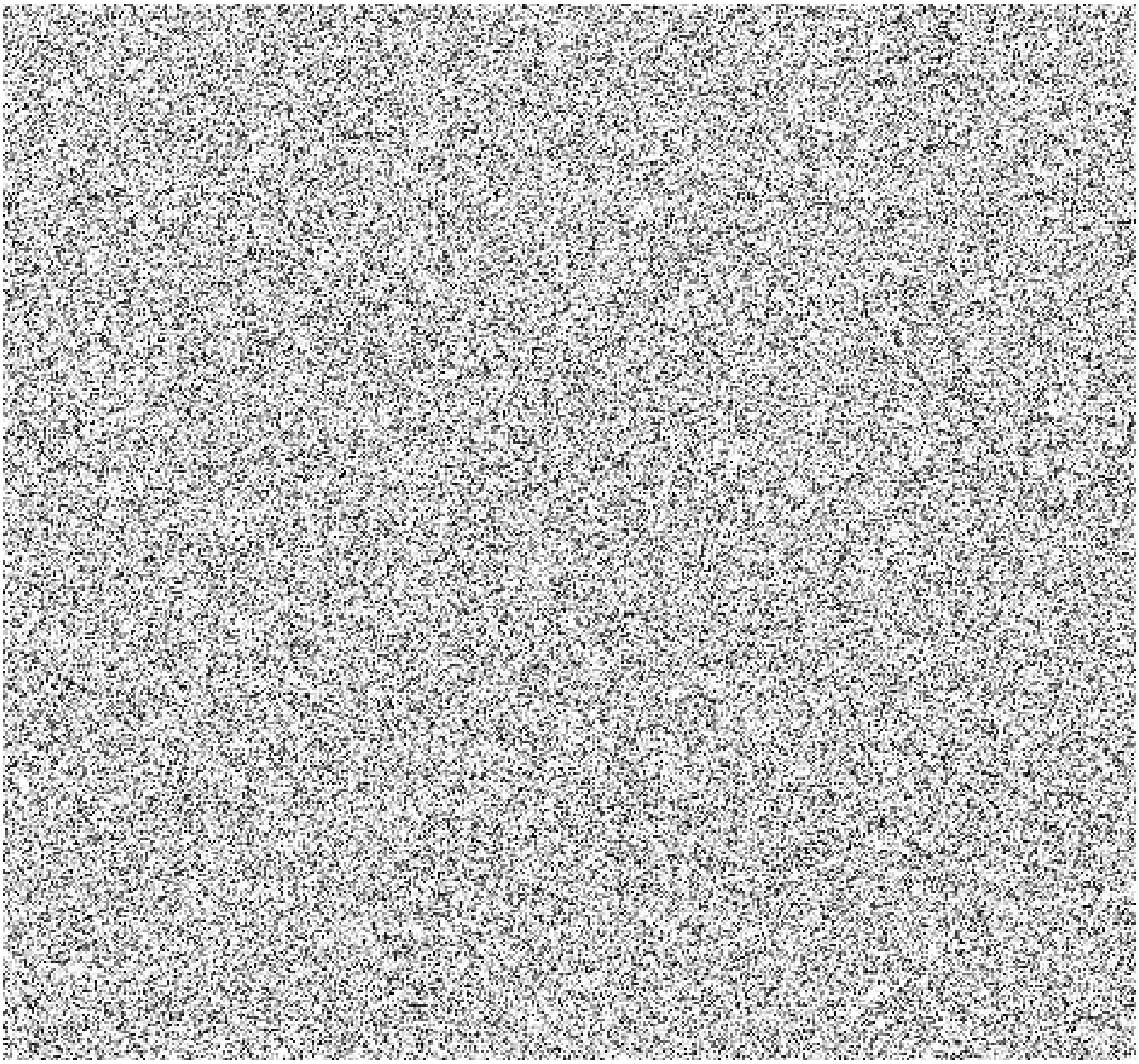


5.2.9.9 CONSTRUCTION AREA D5



5.2.10 ON SITE FACILITY AREAS

5.2.10.1 ON SITE FACILITY AREA B1



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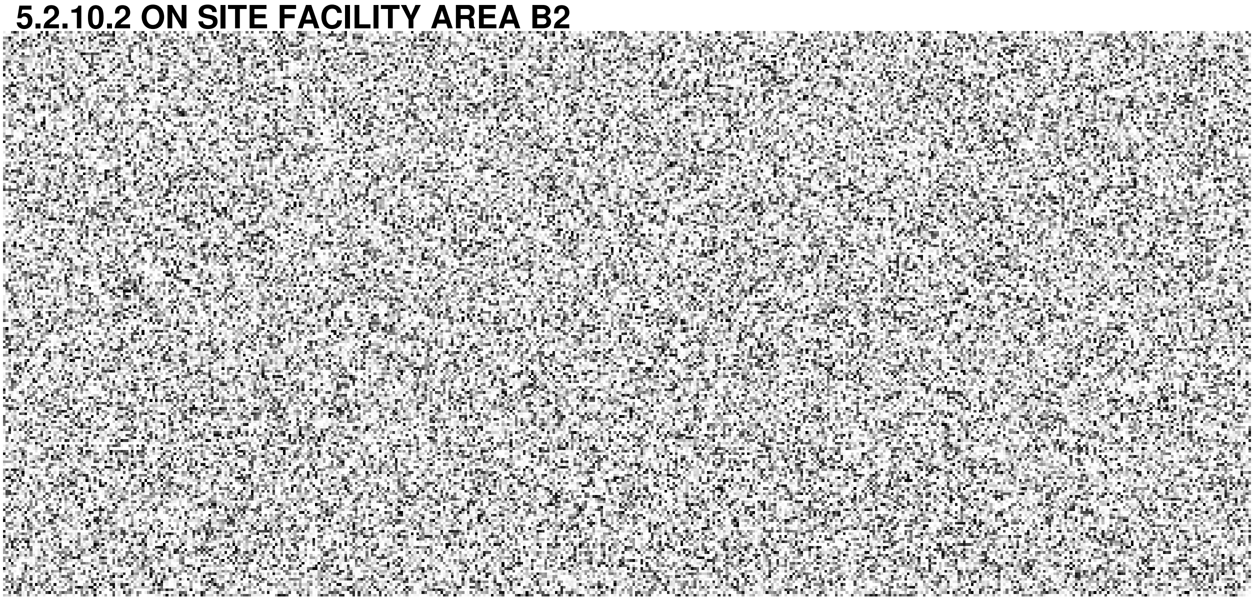

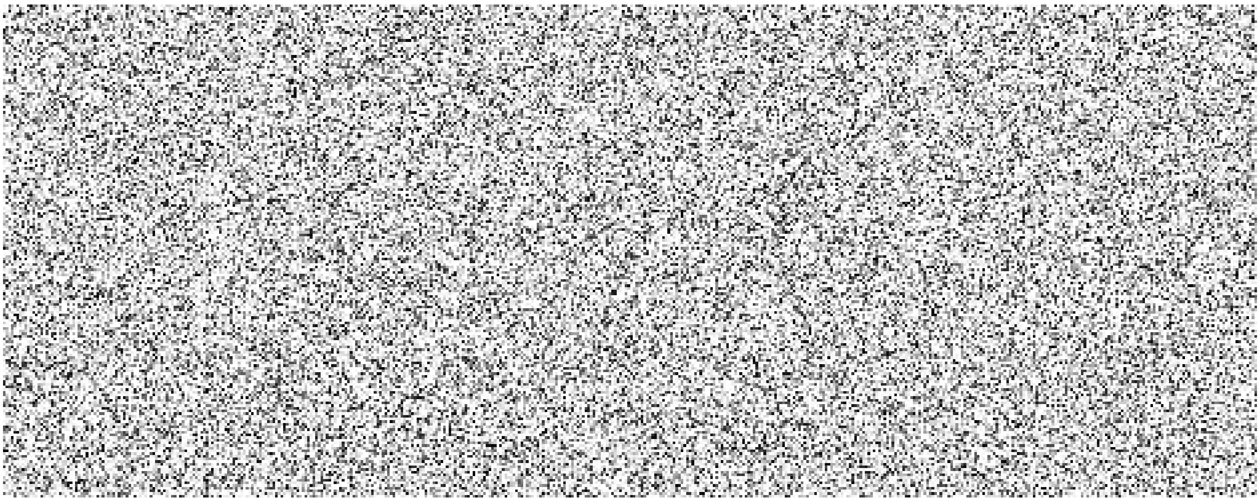

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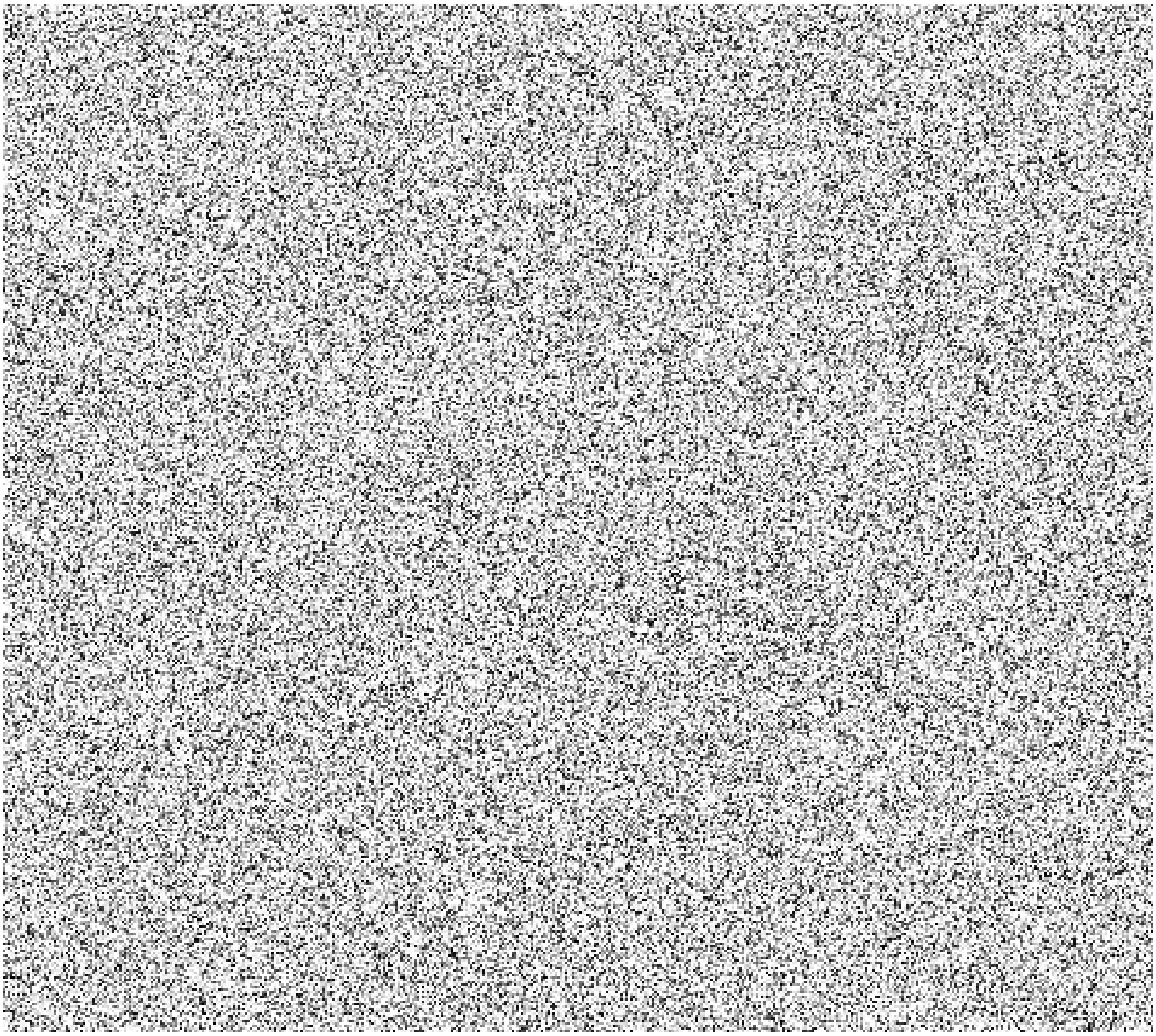

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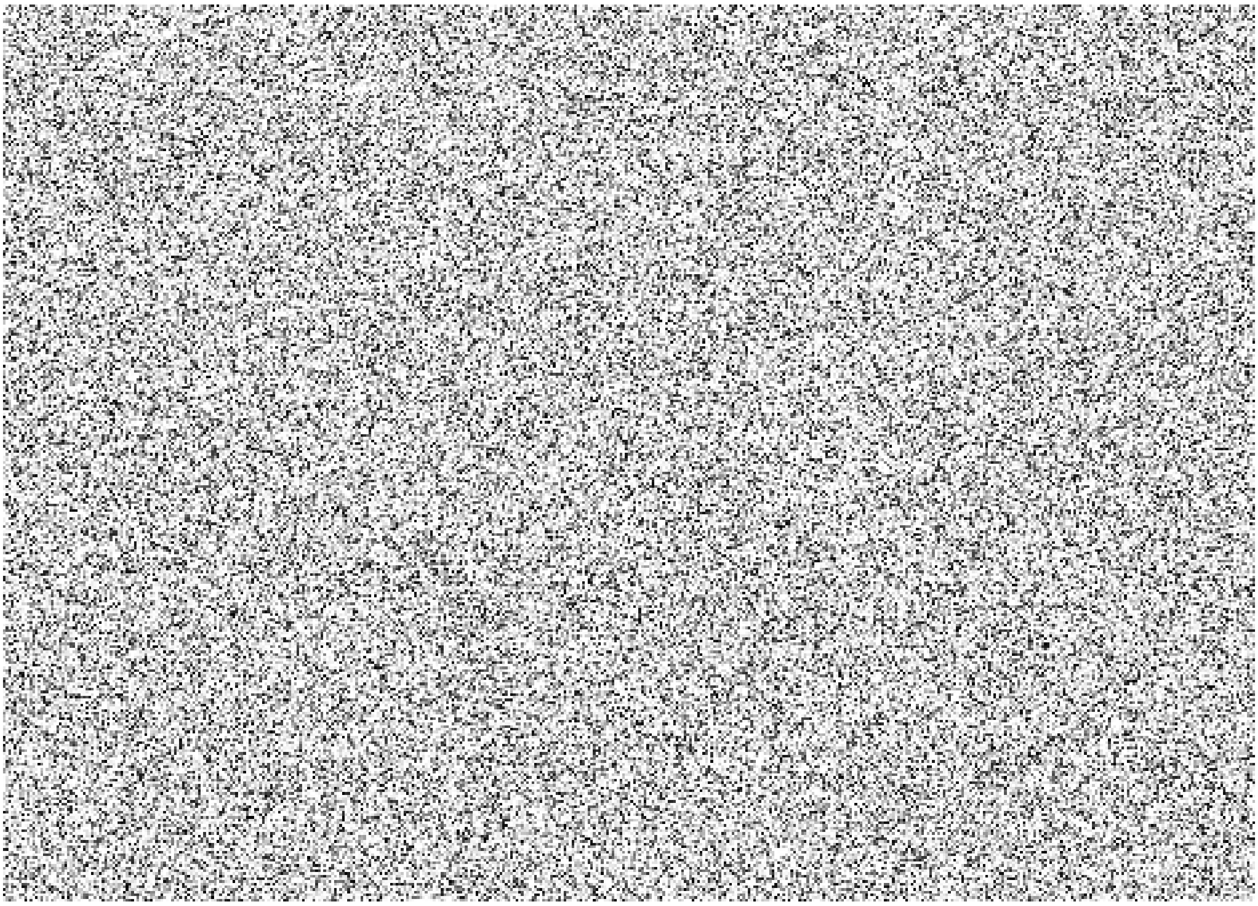
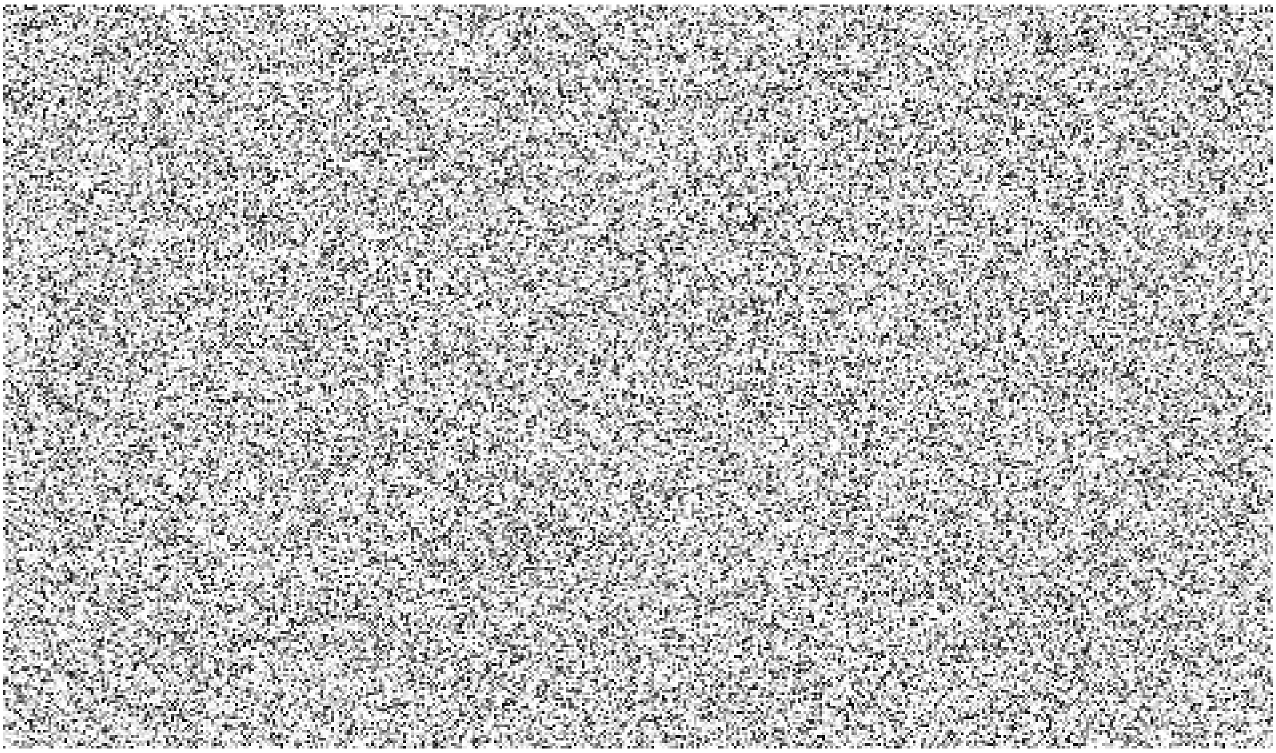
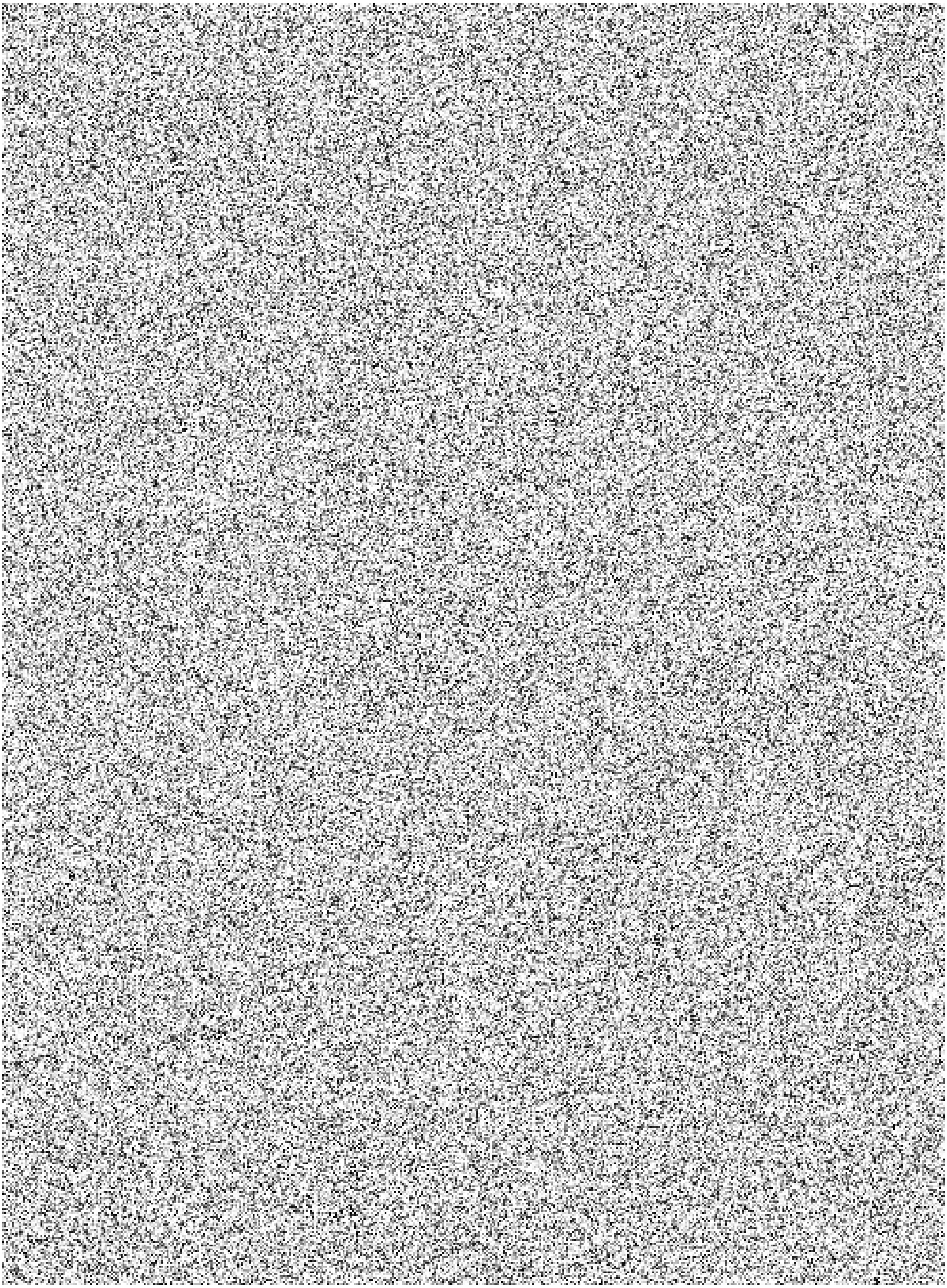
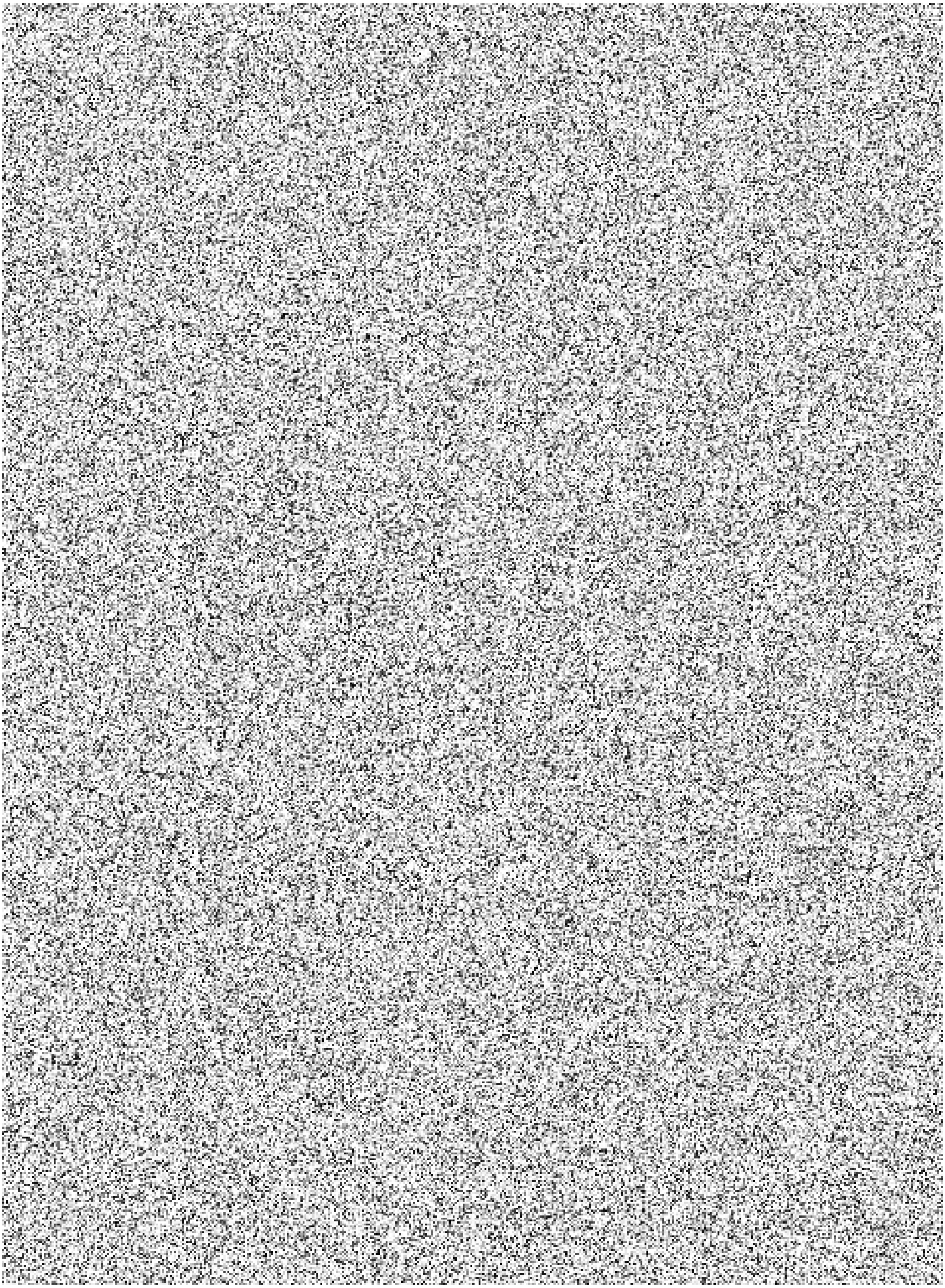
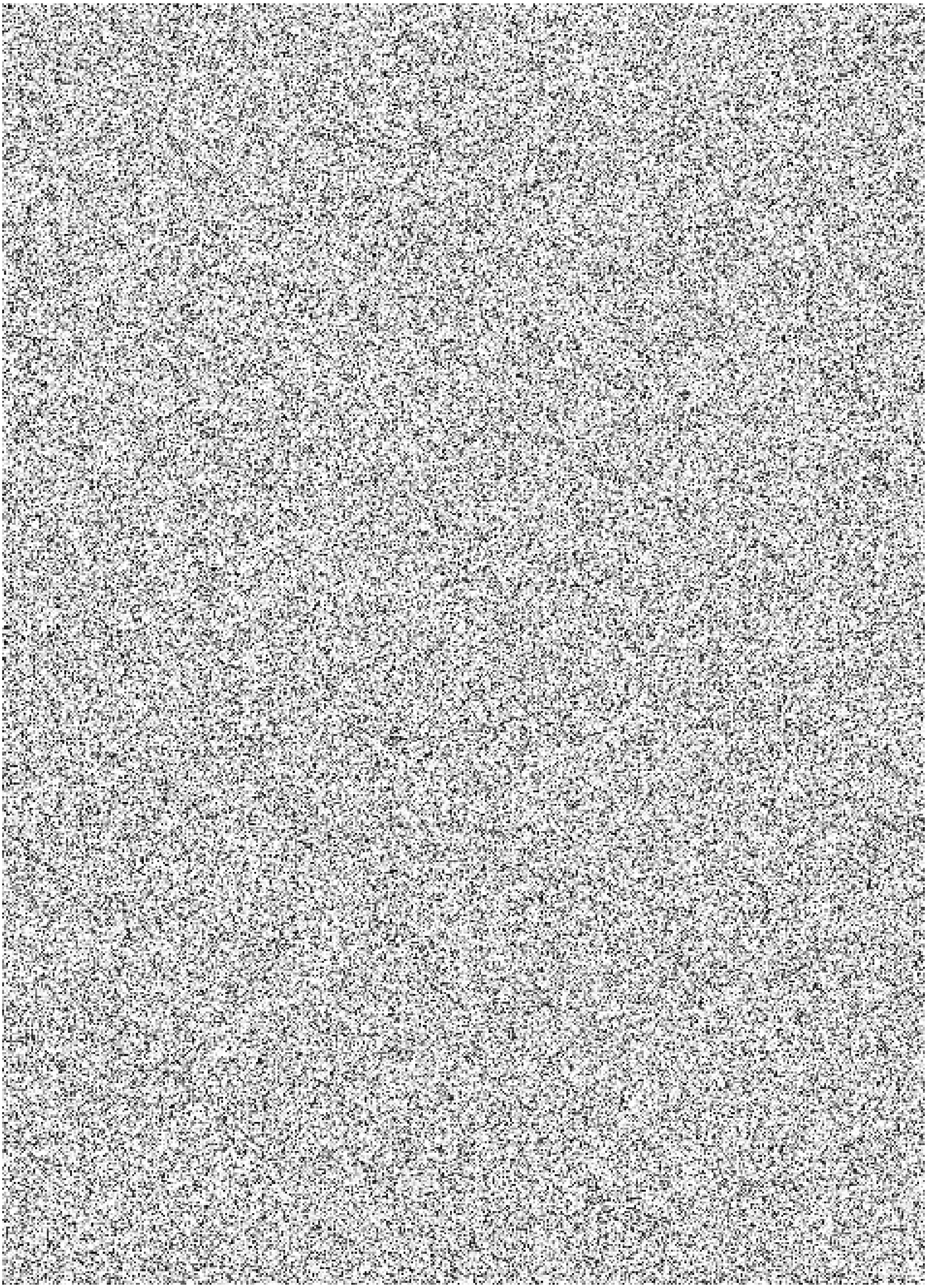


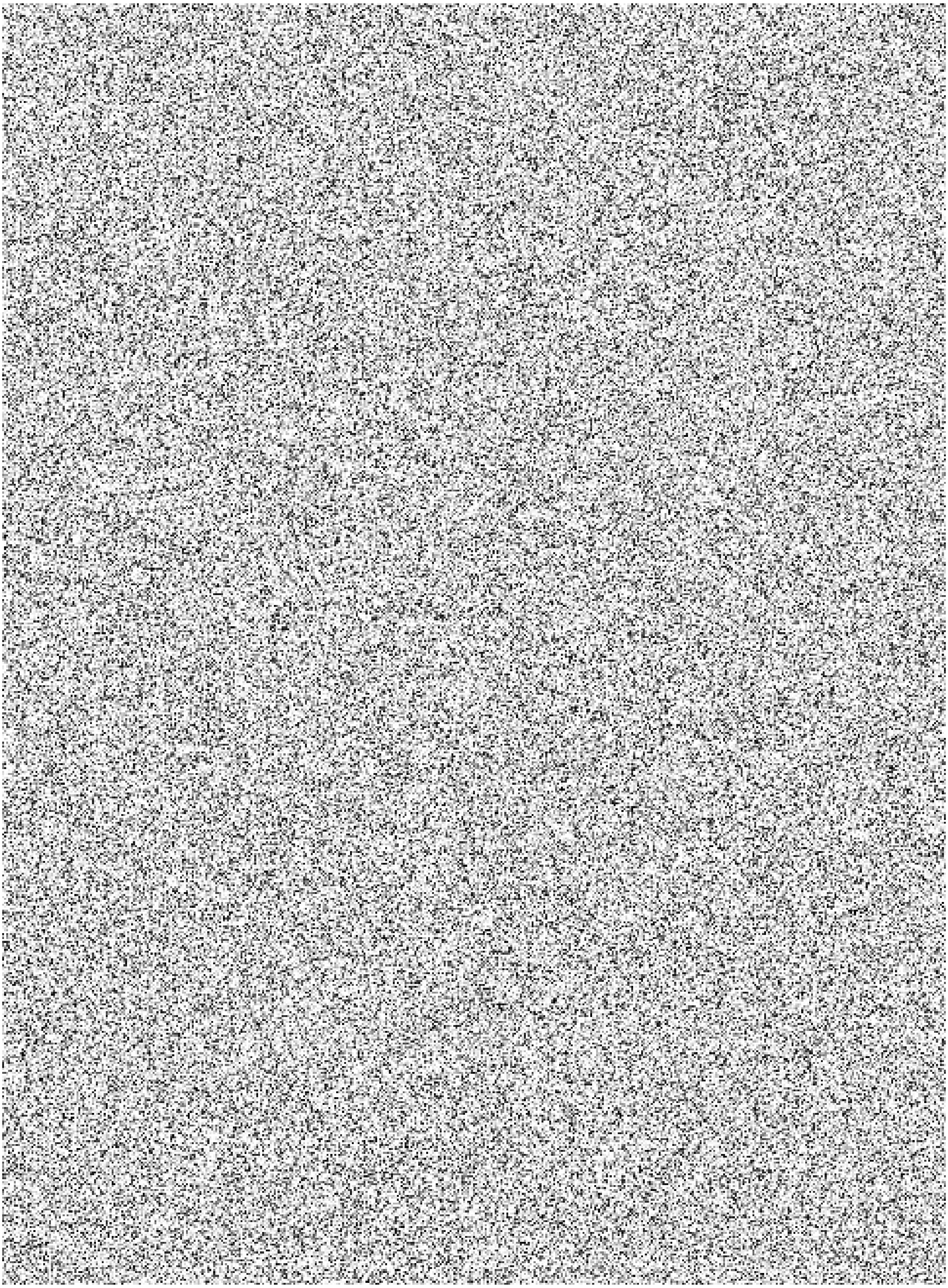
5.2.11 CIVIL STRUCTURES AND TECHNICAL INFRASTRUCTURE ON THE SITE

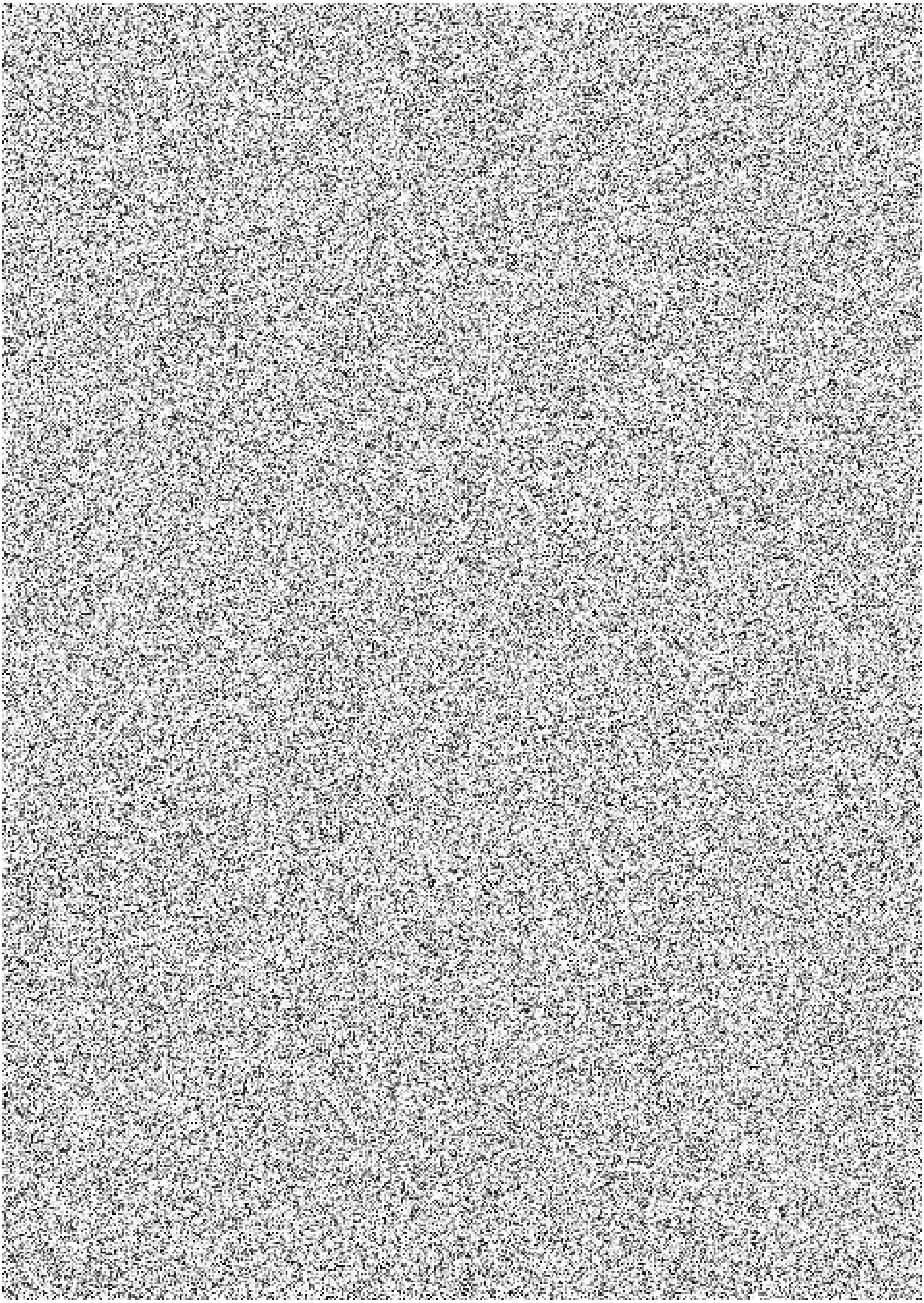


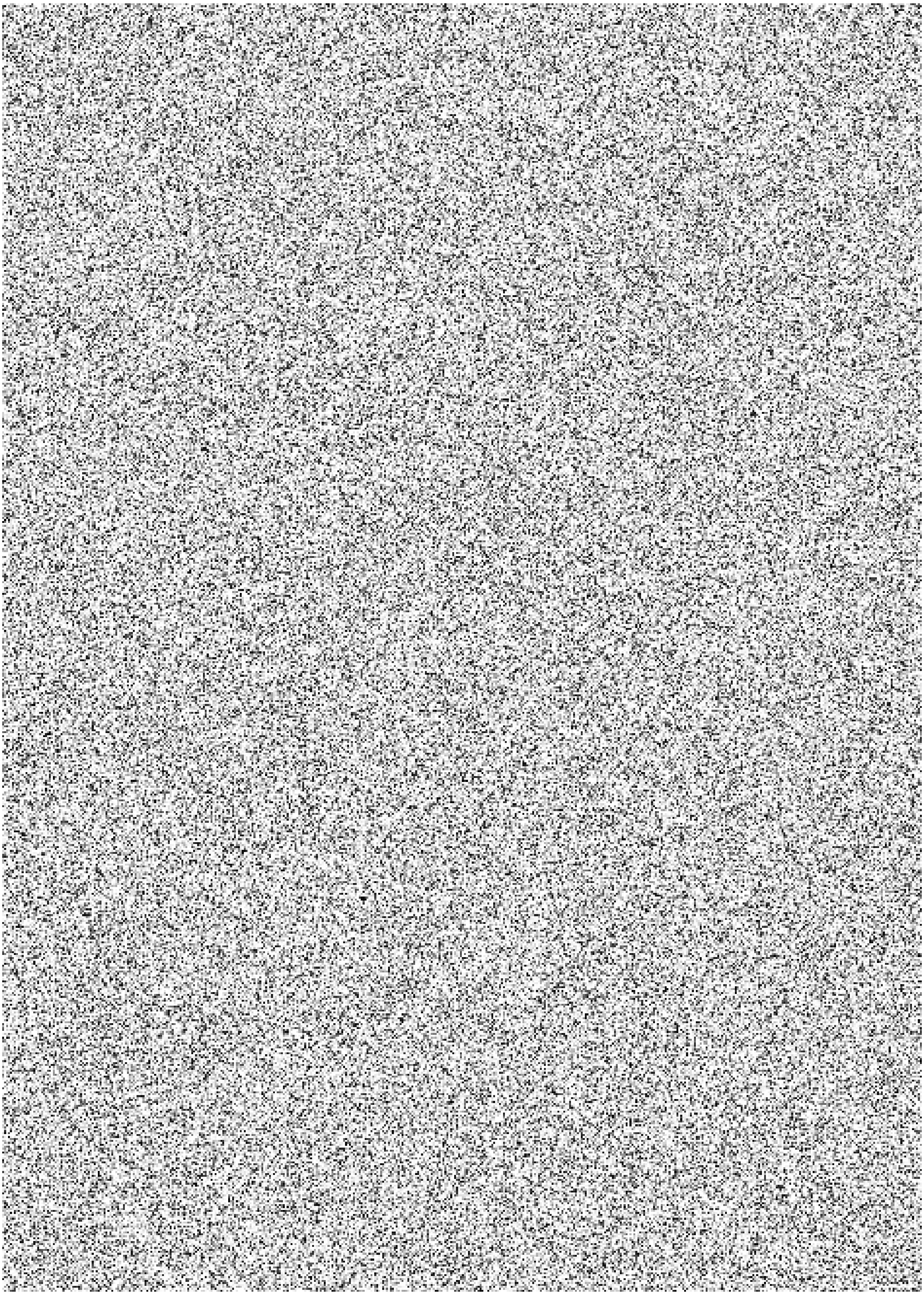


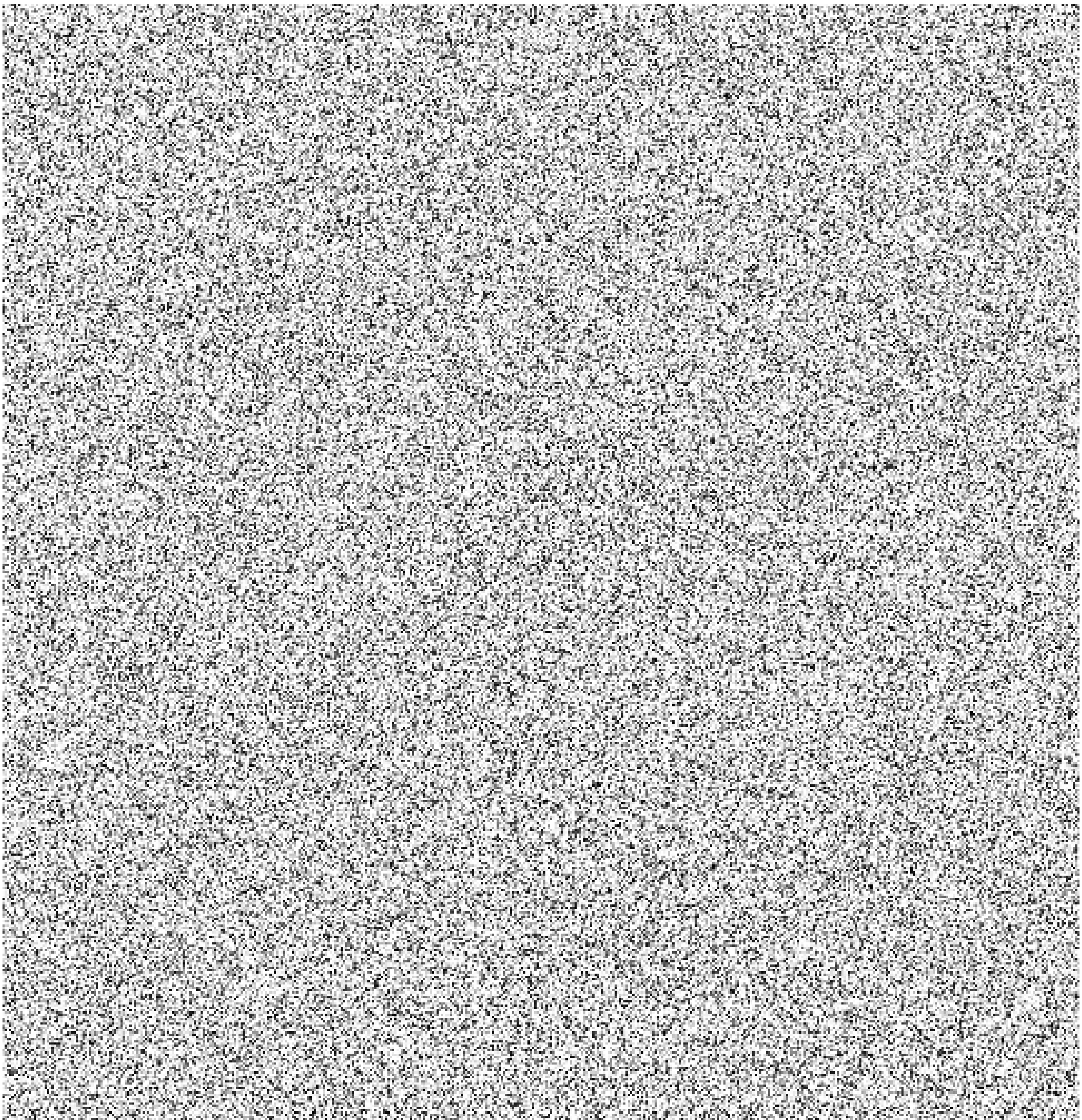


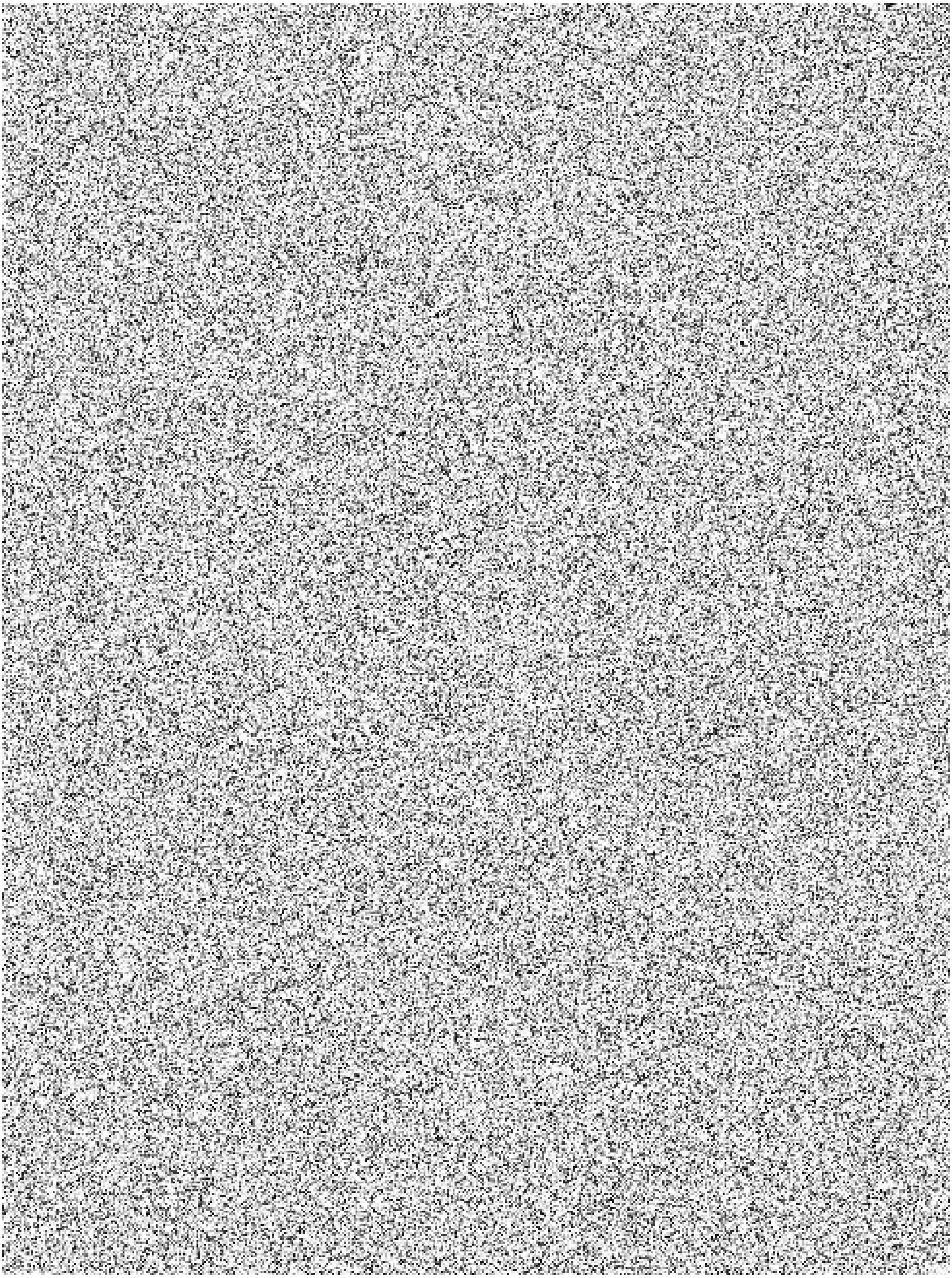


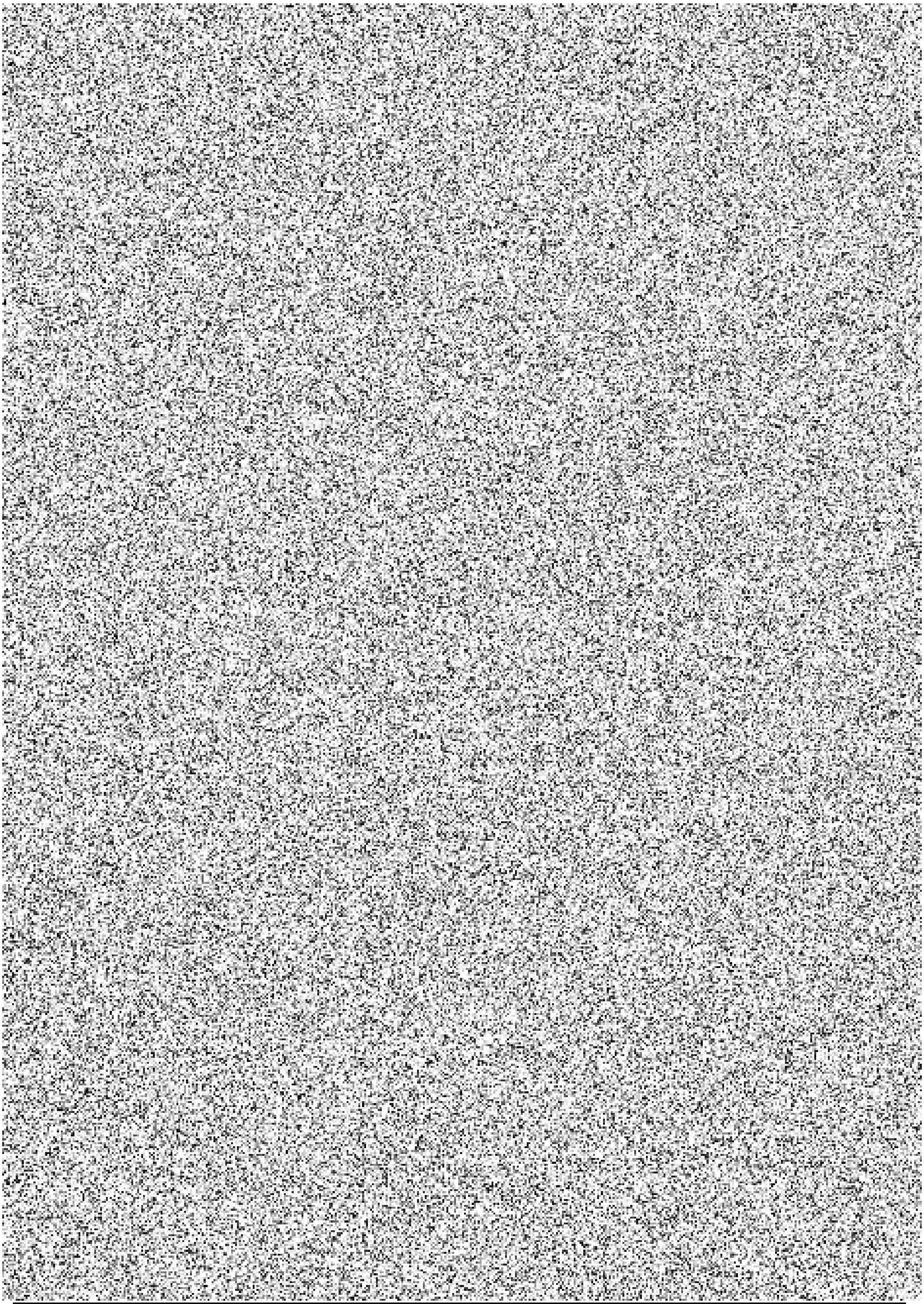


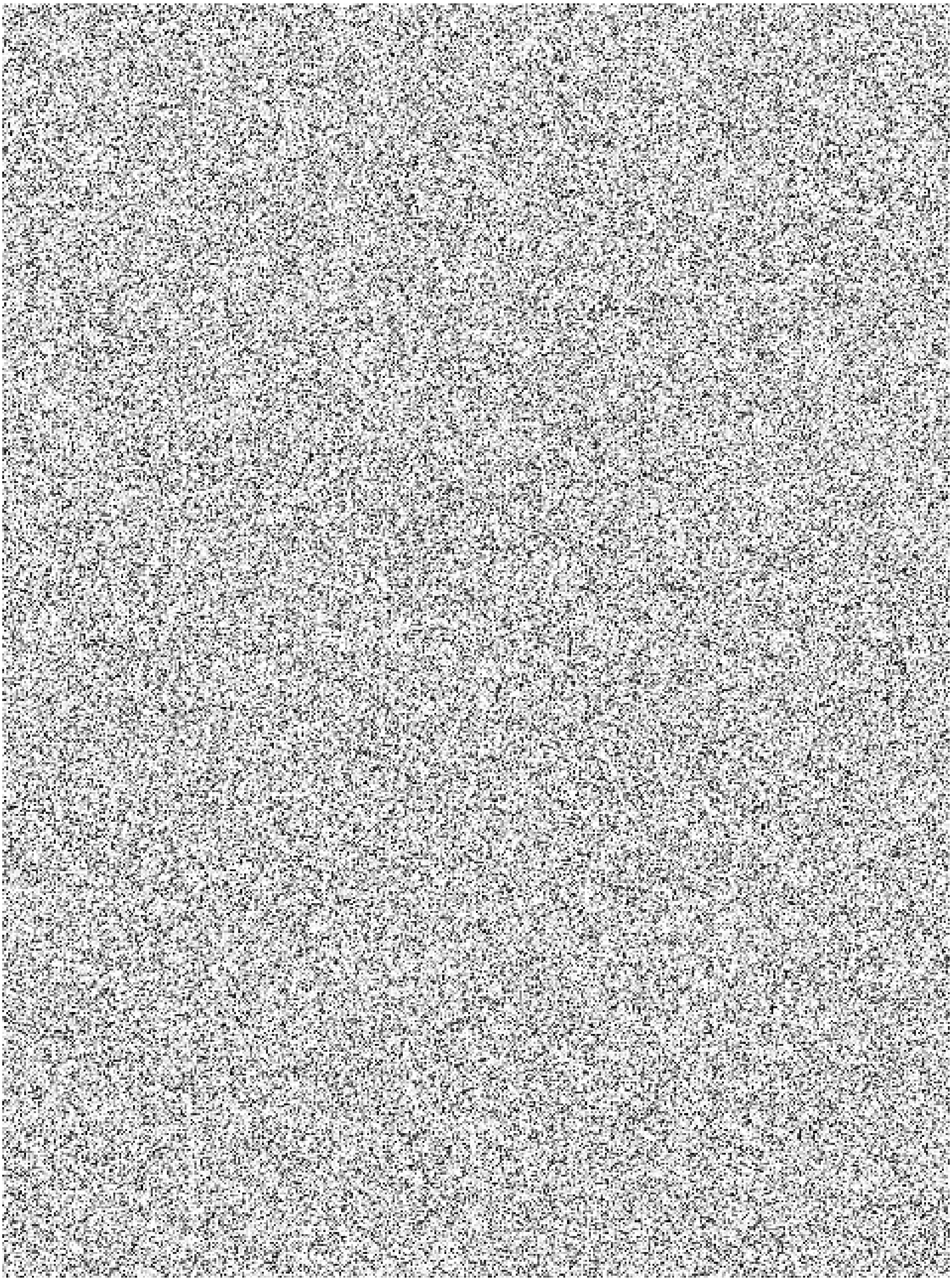


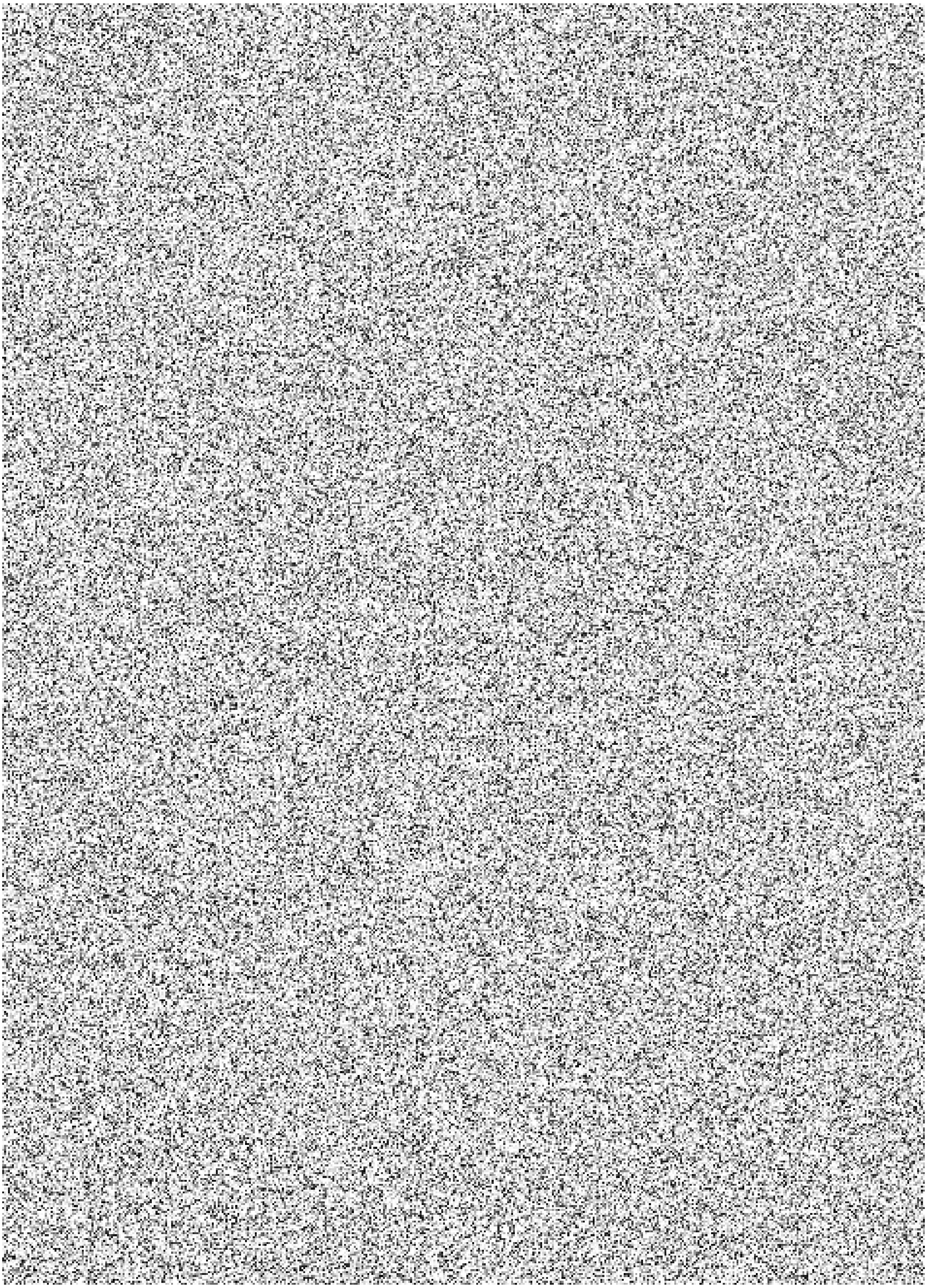


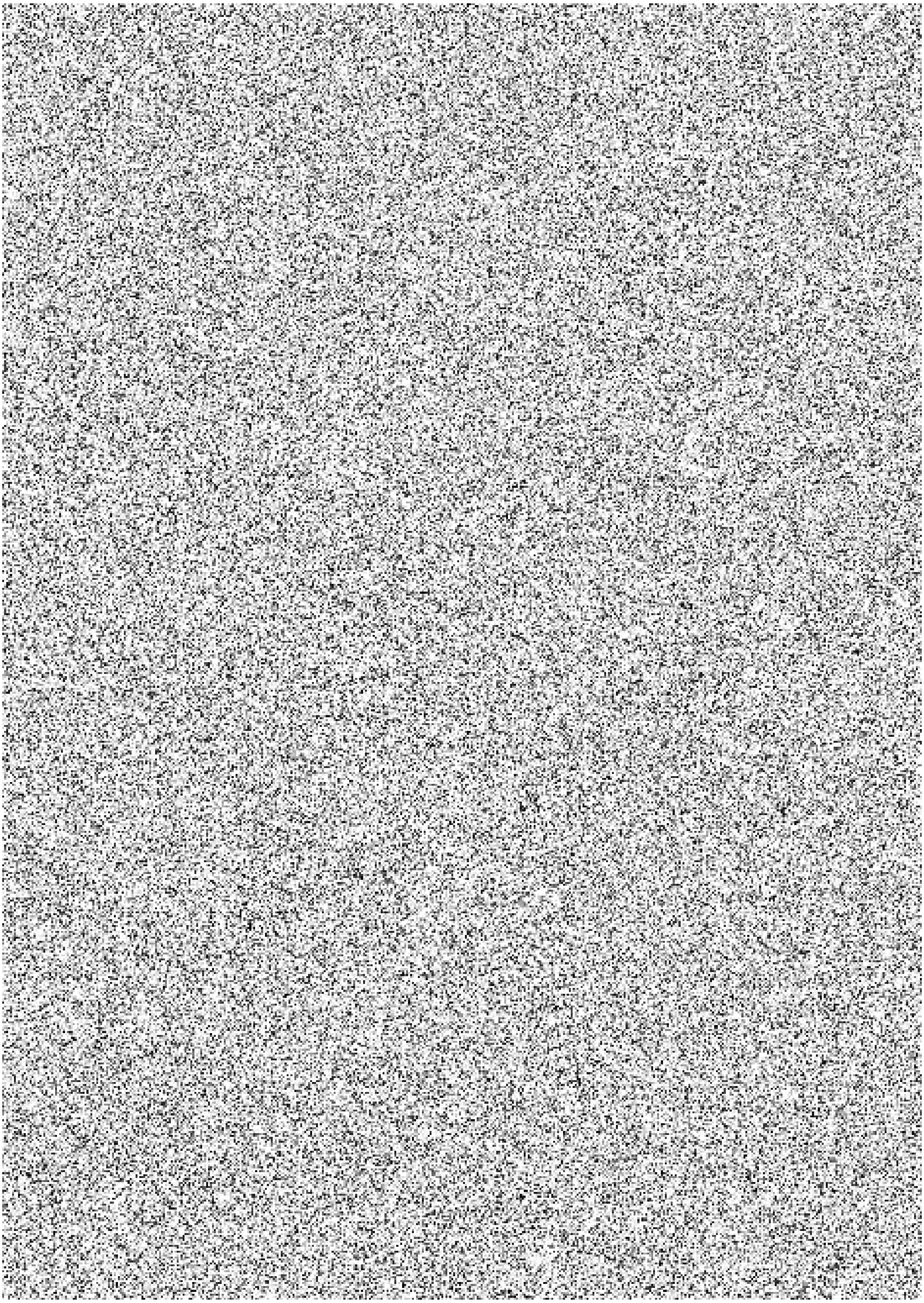


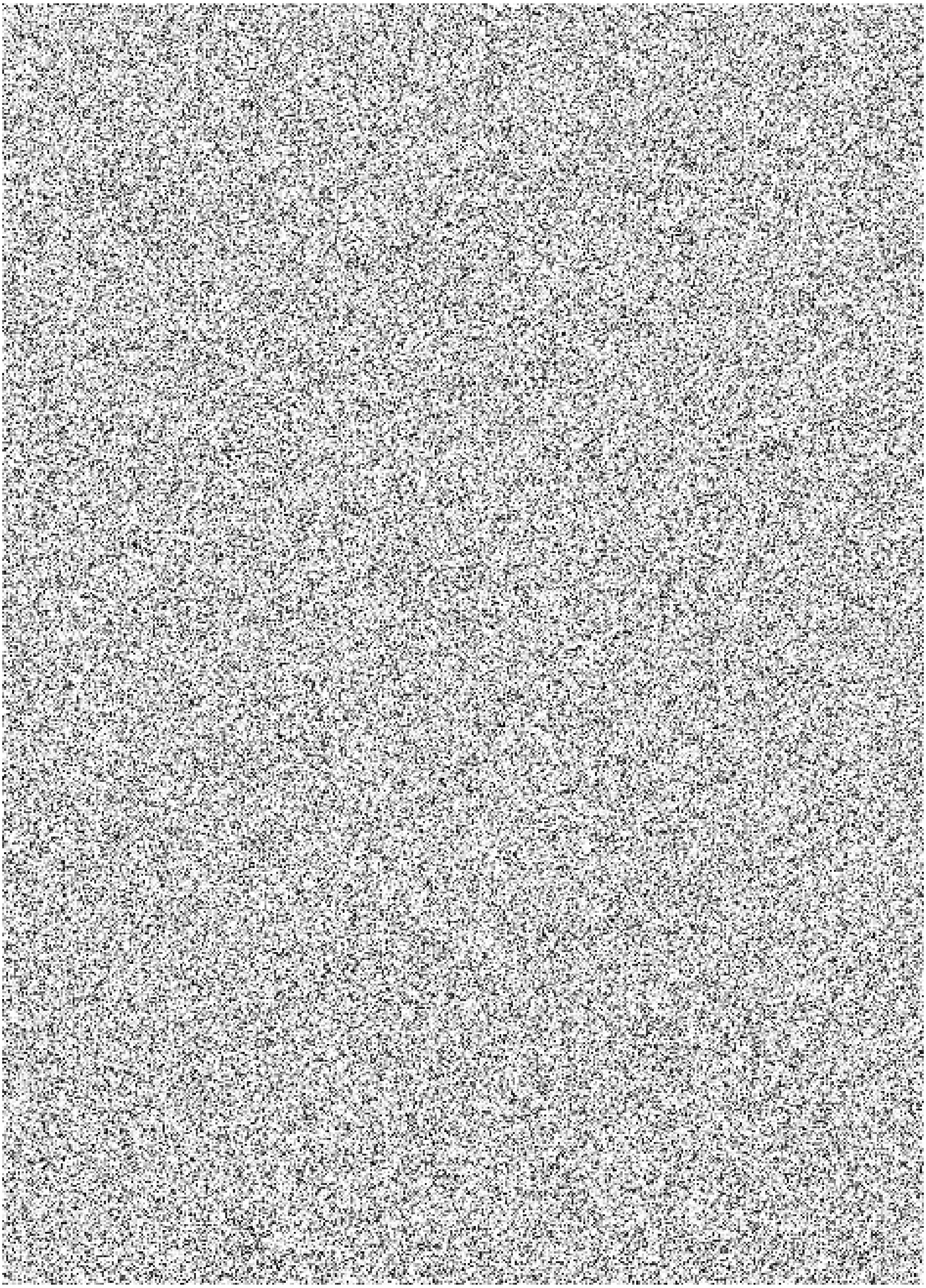


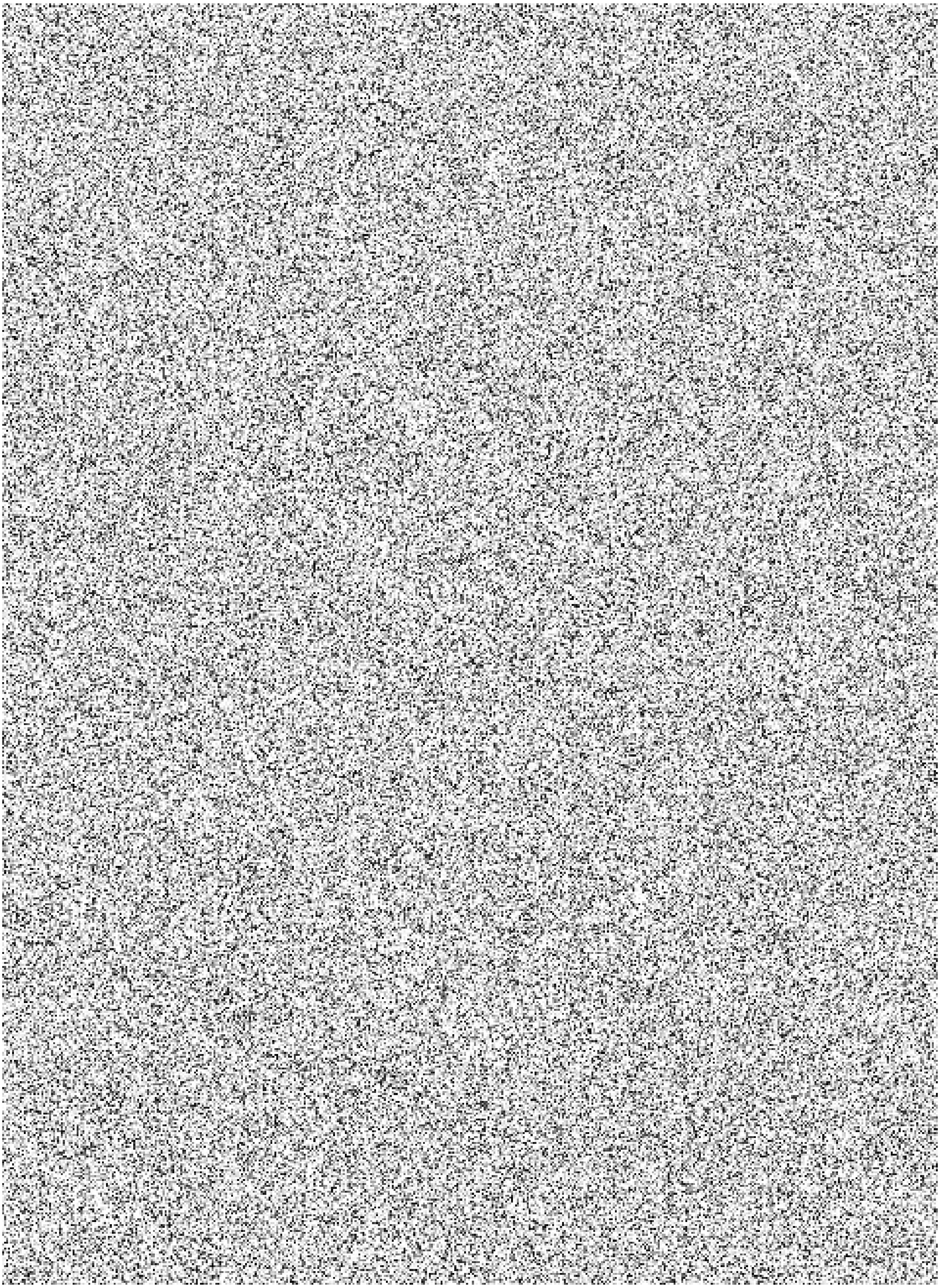


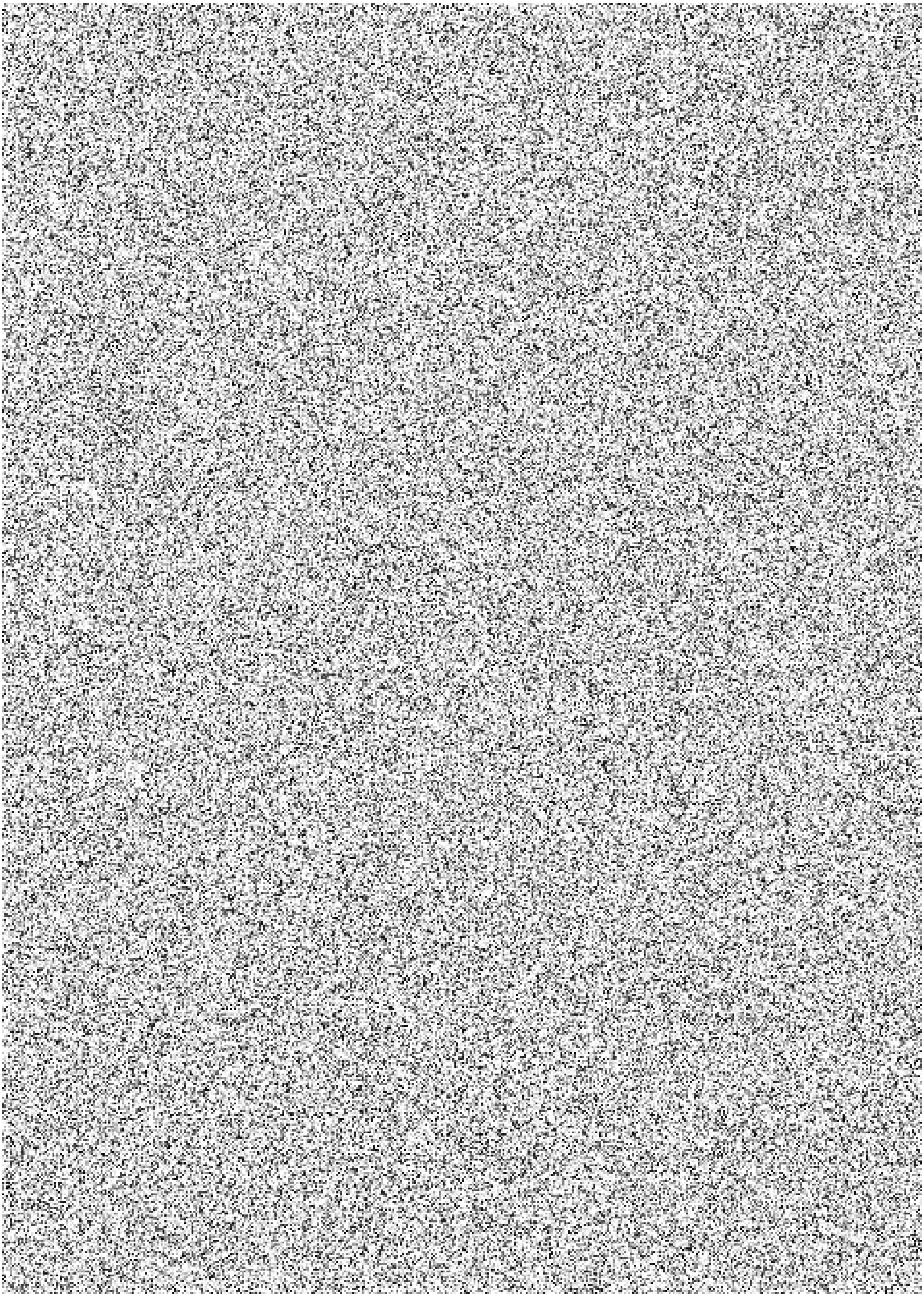


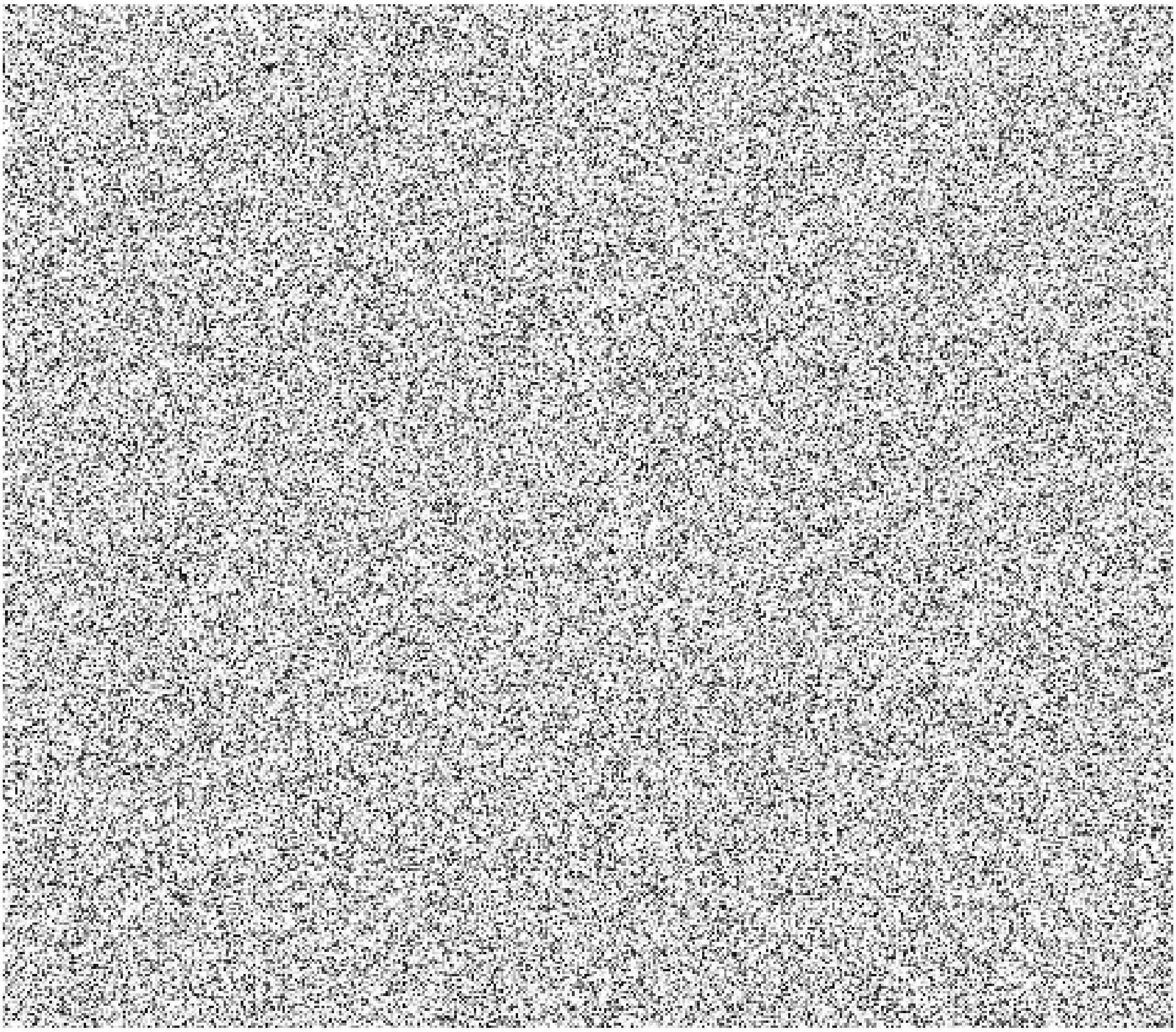












5.2.15 DBEH AND RSEH EXTERNAL NATURAL HAZARDS

Site specific parameters of external natural hazards were analyzed during preparation of Initial Safety Analyses Report and are described in chapters above.

In table below DBEH and RSEH values of external natural hazards were defined based on-site characteristic and shall be considered in the design of the Plant*.