

Branch	Year & Pattern	Subject code	Subject
FE	FE 2019	107001	Engineering Mathematics I
FE	FE 2019	107008	Engineering Mathematics II
FE	FE 2019	107002	Engineering Physics
FE	FE 2019	107009	Engineering Chemistry
FE	FE 2019	103004	Basic Electrical Engineering
FE	FE 2019	104010	Basic Electronics Engineering
FE	FE 2019	102003	Systems in Mechanical Engineering
FE	FE 2019	110005	PPS
FE	FE 2019	102012	Engineering Graphics
FE	FE 2019	101011	Engineering Mechanics
FE	FE 2019	101014	Environmental Studies-II
FE	FE 2019	101007	Environmental Studies-I
FE	FE 2019	111006	Workshop
FE	FE 2019	110013	Project Based Learning
FE	FE 2015	107001	Engineering Mathematics I

FE	FE 2015	107008	Engineering Mathematics-II
FE	FE 2015	104012	Basic Electronics Engineering
FE	FE 2015	103004	BASIC ELECTRICAL ENGINEERING
FE	FE 2015	101011	Engineering Mechanics
FE	FE 2015	102006	Engineering Graphics-I
FE	FE 2015	102014	Engineering Graphics-II
FE	FE 2015	107009	Engineering chemistry
FE	FE 2015	107002	Engineering Physics
FE	FE 2015	102013	Basic Mechanical Engineering
FE	FE 2015	110003	Fundamentals of programmig language I
FE	FE 2015	110010	Fundamentals of programmig language II
FE	FE 2015	101005	Basic Civil and Environmental Engineering

CO1
Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.
the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc
Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
Explain the working of P-N junction diode and its circuits.
Describe and compare the conversion of energy from renewable and non-renewable energy sources
Inculcate and apply various skills in problem solving.
Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
Determine resultant of various force systems

Have an understanding of environmental pollution and the science behind those problems and potential solutions

Demonstrate an integrative approach to environmental issues with a focus on sustainability

Familiar with safety norms to prevent any mishap in workshop.
Project based learning will increase their capacity and learning through shared cognition
CO1: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.

CO1: the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.

Explain the working of PN junction diode and it's circuits

CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.

CO1- Determine resultant of various force systems

To develop imagination of physical object to be represented on paper for engineering communication

Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.

CO 1.Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity,

CO1- Develop, understanding of interference, diffraction and polarization; connect it to few engineering applications.

Define the scope of mechanical engineering, compare and classify the machine elements

To learn and acquire art of computer programming

To learn and acquire art of computer programming

To learn the brief introduction of all area covered under the head of civil engineering



CO2
the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
Learn basics of lasers and optical fibers and their use in some applications
Select appropriate electro-technique and method of material analysis.
Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET
Explain basic laws of thermodynamics, heat transfer and their applications
Choose most appropriate programming constructs and features to solve the problems in diversified domains
Construct the various engineering curves using the drawing instruments
Determine centroid, moment of inertia and solve problems related to friction

Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.

: Explain and identify the role of the organism in energy transfers in different ecosystems.

Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job
Students able to draw on lessons from several disciplines and apply them in practical way.
CO2: the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.

CO2: advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.

identify the types of diodes and it's characteristics and can also compare BJT with MOSFET

CO2: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic

CO2- Determine centroid, moment of inertia and solve problems related to friction

To develop manual drawing skill, drawing interpretation skill

Construct the various engineering curves using the drawing instruments.

2. Select appropriate electro-technique and method of material analysis.

CO2- Learn basics of LASERS and optical fibers and their use in some applications.
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Elaborate the steps in design process.
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To know about some popular programming languages and how to choose programming language for solving a problem in computer

To know about some popular programming languages and how to choose programming language for solving a problem in computer

To understand the need of monitoring land, air, water pollution and take remedial measures to control them
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CO's

CO3
to deal with derivative of functions of several variables that are essential in various branches of Engineering.
to trace the curve for a given equation and measure arc length of various curves
Understand concepts and principles in quantum mechanics. Relate them to some applications.
Demonstrate the knowledge of advanced engineering materials for various engineering applications.
Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.
List down the types of road vehicles and their specifications
Exhibit the programming skills for the problems those require the writing of well documented programs including use of the logical constructs of language, Python.
Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
Determine reactions of beams, calculate forces in cables using principles of equilibrium

Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.

Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources

Able to understand the construction, working and functions of machine tools and their parts
Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.
CO3: to deal with derivative of functions of several variables that are essential in various branches of Engineering.

CO3: to trace the curve for a given equation and measure arc length of various curves.

Build and test analog circuits using opamp and digital circuits using basic gates and flipflops.

CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram

CO3- Determine reactions of beams, calculate forces in cables using principles of equilibrium

To develop physical realization on the dimension of objects.

Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.

3. Demonstrate the knowledge of advanced engineering materials for various engineering applications.

CO3- Understand concepts and principles in quantum mechanics. Relate them to some applications.

Select different manufacturing processes for given engineering applications

To learn basics of programming in C

To learn foundation programming in embedded C, Advanced programming

To understand Basic concept of ecology and ecosystem

CO4
to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.
the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
Understand theory of semiconductors and their applications in some semiconductor devices.
Analyze fuel and suggest use of alternative fuels
Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
Use different electronics measuring instruments to measure various electrical parameters
Illustrate various basic parts and transmission system of a road vehicle
Demonstrate significant experience with the Python program development environment.
Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.
Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space

: Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.

Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings

Able to know simple operations (Turning and Facing) on a centre lathe.
CO4: to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.

CO4: the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.

use different electronic measuring instruments to measure various electric parameters.

CO4: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions

CO4- Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space

Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

4. Analyze fuel and suggest use of alternative fuels.

CO4- Understand theory of semiconductors and their applications in some semiconductor devices.

Select machine tools for manufacturing of machine components

CO5	CO6
the essential tool of matrices and linear algebra in a comprehensive manner for analysis of	
evaluation of multiple integrals and its application to find area bounded by curves, volume	
Summarize basics of magnetism and superconductivity. Explore few of their technological applications.	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application
Identify chemical compounds based on their structure.	Explain causes of corrosion and methods for minimizing corrosion
Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.	Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge
Select sensors for specific applications	
Discuss several manufacturing processes and identify the suitable process	Explain various types of mechanism and its applicati
Draw the development of lateral surfaces for cut section of geometrical solids	Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.
Calculate position, velocity and acceleration of particle using principles of kinematics	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
CO5. the essential tool of matrices and linear algebra in a comprehensive manner for analysis of	
system of linear equations, finding linear and	

CO5. evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces. Centre of gravity and

Select sensors for specific applications.

Describe basic principles of electronic communication

CO5: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.	CO6. Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
CO5- Calculate position, velocity and acceleration of particle using principles of kinematics	CO6- Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy.
: Draw the development of lateral surfaces for cut section of geometrical solids.	Draw fully dimensioned 2D, 3D drawings using computer aided drafting tools.

5. Identify chemical compounds based on their structure.

6. Explain causes of corrosion and methods for minimizing corrosion.

CO5- Summarize basics of magnetism and superconductivity. Explore few of their technological applications.	CO6 - Comprehensive use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their applications.
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Explain the basic concepts of thermodynamics, principle of energy conservation and conversion

Identify and explain different power producing and power consuming devices

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[illegible]

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PROGRAMME OUTCOMES

- 1.To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic
- 2.To analyze the problem by finding its domain and applying domain specific skills
- 3.To understand the design issues of the product/software and develop effective solutions with appropriate cost
- 4.To find solutions of complex problems by conducting investigations applying suitable technology
- 5.To adapt the usage of modern tools and recent software.
- 6.To contribute towards the society by understanding the impact of Engineering on global
- 7.To understand environment issues and design a sustainable system.
- 8.To understand and follow professional ethics.
- 9.To function effectively as an individual and as member or leader in diverse teams and in
- 10.To demonstrate effective communication at various levels.
- 11.To apply the knowledge of Computer Engineering for development of projects, and its finance and management
- 12.To keep in touch with current technologies and inculcate the practices of lifelong learning



Program Specific Outcomes (PSO)

- PSO-1 Students will apply the knowledge to identify, formulate and solve problems of power generation, transmission and distribution.
- PSO-2 Students will be able to implement the fundamentals of electrical measurements, electrical machines, and power electronics.
- PSO-3 Students will be able to prepare, simulate and analyze the mathematical model of physical electrical systems.
- PSO-4 Students will be able to apply professional skills with effective communication to handle the project work.



OUTCOMES

1. Analysis to solve complex engineering problems.

2. Consideration of public health and safety, cultural, societal, and environmental issues in design.

3. Design aspect.

4. Interdisciplinary settings.

5. Management.

6. Learning.

7. Transmission, Distribution, protection and high voltage engineering systems under different operating conditions.
8. Design of power systems, and electronic circuits for design and control applications.
9. Analysis of power systems and analyze by using classical and modern tools.
10. Design and prepare engineering documents.

Year & Pattern	Subject code	Subject	CO1
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Year & Pattern	Subject code	Subject	CO1
SE 2015	201002	Strength of Material	Compute different type of stresses in determinate, indeterminate, homogeneous and composite structures
SE 2015	201003	Geotechnical Engineering	Differentiate the different types of soil and their engineering properties and classify them
SE 2015	201001	Building Technology & Material	Identify types of building and basic requirements of building components
SE 2015	201006	Surveying	Operate and use surveying equipment
SE 2015	207001	Engineering Mathematics III	Solve higher order linear differential equations and apply to civil engineering problems such as bending of beams and twisting of shafts.
SE 2015	201004	Fluid Mechanics I	Use fluid properties, dimensional analysis for solving problems of fluid flow.
SE 2015	201008	Structural Analysis I	Understand the basic concept of static & kinematic indeterminacy, slope & deflection of determinate and indeterminate beams for analysis of structures.
SE 2015	201009	Engineering Geology	Explain the basic concepts of engineering geology.

SE 2015	201005	Architectural Planning & Design of Building	Make use of principles of planning and principles of architectural Planning.
SE 2015	201007	Concrete Technology	Understand chemistry, properties, and classification of cement, fly ash, aggregates and admixtures, and hydration of cement in concrete.
SE 2015	201010	Sof Skill	Make use of techniques for self-awareness and self-development.

Year & Pattern	Subject code	Subject	CO1
TE 2015	301004	Structural Analysis II	Calculate static and kinematic degree of indeterminacy of structure
TE 2015	301003	Structural Design I	Able to explain various design philosophy, classify structural steel
TE 2015	301005	Fluid Mechanics II	Able to analyze the basics of flow around submerged bodies, and
TE 2015	301001	Hydrology & Water	Able to describe the hydrological cycle and analyse the precipitation
TE 2015	301002	Infrastructural Engineering	Able to explain Need of Infrastructure Development in India
TE 2015	301010	Structural Design II	Able to distinguish different design philosophies of design of R.C.
TE 2015	301009	Foundation Engineering	Ability to Understand the importance of soil investigation
TE 2015	301007	Advance Surveying	Able to carry out field geodetic survey and apply triangulation
TE 2015	301011	Environmental Engineering I	able to explain sources , effects, measurements of noise and air
TE 2015	301008	Project Management	Able to explain the importance, objective, and functions of project
TE 2016	301012	Seminar	Establish motivation for any topic of interest and develop a thought

Year & Pattern	Subject code	Subject	CO1
BE 2015	401001	Environmental Engineering II	Able to explain component of sewage collection, conveyance and
BE 2015	401003	Structural Design III	To study the concept & design of Prestressed Concrete.

BE 2015	401002	Transportation Engineering	Able to calculate the lengths of different category roads and the
BE 2015	401005	Total Quality Management	based on the saturation system carry out feasibility surveys
BE 2015	401004	Architectural Town Planning	Aware of the role of an urban planner and architect in planning,
BE 2015	401004	Advanced Concrete	. Able to identify types of cement and aggregate to be used to
BE 2015	401004	Adv Geology	Identify various seismic zones and physiographic divisions of India.
BE 2015	401007	Dams & Hydraulic	Able to classify various Dams and check their performance by various
BE 2015	401008	Quantity Surveying &	Able to describe types of estimates and importance of approximate
BE 2015	401010	Construction Management	Able to explain the basics construction management
BE 2015	401010	Adv Transportation Engineering	Able to explain the importance, objective, and functions of project management.
BE 2015	401009	Air pollution and Control	Able to explain component of atmosphere, scales of meteorology and its parameter, effective height of stack
BE 2015	401006	Project Phase I and II	Find out the gap between existing systems and develop new creative new Practical solution.

Year & Pattern	Subject code	Subject	CO1
ME 2017	501021	Applications of Statistical Methods in construction	Students develop an in-depth knowledge of numerical methods applicable for mechanical engineering
ME 2017	501022	Management and Project Planning in Construction	Able to allocate the funds for each work and execute the same.
ME 2017	501023	Construction Technology	Able to decide which type and capacity of construction equipment can be used for a particular job on site.

ME 2017	501024	TQM in Construction	Measure the cost of poor quality and process effectiveness and efficiency to track performance quality and to identify areas for improvement.
ME 2017	501025	* Elective I (sustainable construction materials)	Development of knowledge in sustainable materials
ME 2017	501 027	Construction Contracts Administration and Management	Able to develop the tender documents for the project
ME 2017	502 028	Project Economics & Financial Management	Able to prepare the balance sheet
ME 2017	502 029	Operations Research	Describe clearly a problem, identify its parts and analyze the individual functions of classical Optimization Techniques.
ME 2017	501 030	* Elective II (Material management)	Able to explain the importance, objective, and functions of project management.
ME 2017	501 033	Environment & Energy for Sustainable Construction	Able to explain the Environment Impact factors and it's measurement
ME 2017	501 034	Research Methodology	Understand some basic concepts of research and its methodologies.literature review
ME 2017	502 035	* Elective III (Infrastructure development)	Able to apply a basic project economics in construction industry

TSSM's
BHIVARABAI SAWANT COLLEGE OF ENGINEERING &
Department of Civil Engineering
Academic Year 2019-20 Semester
CO's

CO2	CO3
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SE SEM I an

CO2	CO3
Develop bending and shear stress diagram	Determine the torsional stresses and stresses due to strain energy for different loading conditions
Determine the soil properties in laboratory and develop a proficiency in handling experimental data	Understand of the concept of effective stress and its influence on soil behavior
Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding	Elucidate different types of flooring and roofing materials
Draw plan or map of the existing permanent features on the ground	Classify the ground features from the map or plan
Solve system of linear equations using direct and iterative numerical techniques and develop solutions to ordinary differential equations using single	Apply statistical methods like correlation, regression analysis in analyzing and interpreting experimental data and probability theory applied to
Solve fluid statics problems.	Measure fluid pressure
Analyze indeterminate beams structures and frames.	Evaluate determinate and indeterminate trusses and its application in the field.
Differentiate between the different rock types, their inherent characteristics and their	Understand physical properties, mechanical properties of the minerals and their

Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an	Improve the status of existing structures by proposing appropriate green measures.
Prepare and test the fresh concrete	Test hardened concrete with destructive and nondestructive testing instruments
Apply the conceptual understanding of communication into everyday practice.	Understand the importance of teamwork and group discussions skills.

TE SEM I ar

CO2	CO3
Analyze the statically indeterminate beams and pin	Analyze the kinematically indeterminate beams and pin
Able to analyze and design compression members along with	Able to find flexural strength of steel beams and to design the
Able to describe open channel flow and applications of energy and	Able to explain types of flow based on energy depth relationship
Able to explain the stream gauging	Able to explain the methods of irrigation and assess the canal
Able to describe the components of permanent way of railways	Able to explain the techniques and equipment's used for dredging,
Able to apply different limit states for singly reinforced and doubly	Able to design two way slabs and staircases.
Ability to calculate the allowable bearing capacity of Shallow	Ability to Understand the settlement behaviour of different
Able to perform Geodetic trigonometric leveling	Able to perform hydrographic survey and get solution for
Able to explain component of water supply scheme, suitability of	Able to describe and design Aeration, Sedimentation,
Able to analyze the network for planning and scheduling of project	Able to apply project monitoring, resource allocation as well as basic
Organize a detailed literature survey build a document with	Analysis and comprehension of proof-of -concept and data

BE SEM I ar

CO2	CO3
Able to describe stream sanitation and design screen chamber, grit	Able to describe and design secondary treatment units with
To study different types of losses during prestressing & different type	To design of Prestressed concrete simply supported rectangular and

Able to analyse traffic characteristics by conducting	Able to design the geometric elements and structural design of
Measure the cost of poor quality and process effectiveness and	Understand proven methodologies to enhance management processes,
Able to identify significance of built environment, urban design,	Able to explain the importance of Sustainable development
Able to describe special types of concrete and their properties	Able to design special types of concrete mix of specified strength
Demonstrate relationship of effects of soil erosion process on	Demonstrate role of engineering geology for resource planning and
Able to Design, analyze stability of Gravity Dam for various load	Able to classify various types of spillways & Spillway Gats.
Able to prepare detailed estimate for Civil Engineering Structures.	Able to draft suitable specifications to meet expectations of client and
Able to implement construction scheduling and illustrate work	Able to describe labour laws and financial aspects of construction
Able to analyze the network for planning and scheduling of project	Able to apply project monitoring, resource allocation as well as basic knowledge of project management software for controlling of project
Able to describe ambient air quality sampling and technique of its analysis.	Able to describe and design of effective stack height and parameter of Indoor air quality
Learn about the literature review	Get the experience to handle various tools, tackles and machinery for civil work.

ME SEM I, II, :

CO2	CO3
Students develop the ability to formulate and to obtain the numerical solution of mechanical engineering problems	Students will be able to compare different numerical schemes
Able to calculate the total time required to complete the job without delay and delay in the project.	Able to estimate the amount of additional funds which may require to complete the job
Able to know the various tests on fresh, hardened concrete, special concrete and the methods of manufacturing of concrete.	Able to check the quality of hardened concrete by using Various NDT Tests

Understand proven methodologies to enhance management processes, such as benchmarking and business process re-engineering.	Choose a framework to evaluate the performance excellence of an organization, and determine the set of performance indicators that will align people with the objectives of the organization.
skill enhancement on construction sites	Get the experience to handle various tools, tackles and machinery for civil work.
Able to attain the knowledge on arbitration	Able to present the contract documents as per CPWD
Able to prepare the cash flow statement.	
Feasibility study for solving an optimization problem.	Becoming a mathematical translation of the verbal formulation of an optimization problem.
Able to apply project monitoring, resource allocation as well as basic knowledge of project management software for controlling of project	able to apply material logistics
Able to understand the Socio Economic Impacts	Able to understand various Environment and Pollution Control Laws and it's implementation
Identify appropriate research topics.	Select and define appropriate research problem and parameters.Data collection
Able to apply project monitoring, resource allocation as well as basic knowledge of project management software for controlling of project	Able to identify significance of built environment, urban design, renewal for quality of life and livability

CO4	CO5
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id II

CO4	CO5
Explain the concept of principal stresses due to combined loading and & to compare the values of analytical & graphical (Mohr's	Plot loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).
Develop an understanding of the influence of water flow on the engineering behavior of soils	Analyze engineering properties like compaction, permeability, soil shear strength
Describe types of doors, windows, arches and lintel	Illuminate means of vertical circulation and protective coatings.
Analyze temporary adjustments and check permanent adjustments of the Theodolite	
Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Calibrate discharge measuring instrument like venturimeter, orifice meter.	Distinguish between various types of fluid flows and find the fluid velocity using principles of Kinematics & Dynamics
Apply influence line diagrams for the analysis of structures under moving load.	Analyze two and three hinged arches and its application.
Identify favourable and unfavourable conditions for the buildings, roads, dam,	Explain mass wasting processes, effects of mass wasting process on the civil

Plan effectively various types of buildings according to their utility with reference to <u>different codes.</u>	Understand and resolve contemporary issues at multi-dimensional functional levels.
Get acquainted to concrete handling equipments and different special concrete types.	Design concrete mix of desired grade
Develop time management and stress management.	Apply business etiquette skills effectively an engineer requires.

id II

CO4	CO5
Analyze the 2-D rigid jointed rectangular portal frame by any of	Calculate the deflection of the beam by using any of the available
Able to analyze the loads and their effects on connection & plate	Able to analyze the loads and their effects on gantry girder and design
Able to analyze uniform flow formula and characteristics of	Able to explain the impact of jets and working of centrifugal pump
Able to describe the the ground water hydrology	Able to analyse the flood frequency and runoff hydrograph.
Able to illustrate types of tunnels and their construction techniques.	Able to explain docks and harbors.
Able to design flexural member.	Able to design flexural members for shear, bond, torsion and design
Ability to Evaluate Load caring capacity of deep foundation	Able to understand sheet piles and characterization of BC soil,
Able to describe aerial photography and applications in civil engineering	Able to explain Remote sensing and GIS and its application in civil
able to describe and design Filtration and disinfection processes	able to describe water softening methods , demineralization , water
Able to apply a basic project economics in construction industry	Able to apply different methods of analysis for project resource
Effective presentation and improve soft skills	Make use of recent and new technology (Eg;Latex) for creating

id II

CO4	CO5
Able to describe low cost treatment methods, viz,. Oxidation pond,	Able to describe anaerobic treatment processes as anaerobic
To Design of one way and two way post tensioned slabs (Single panel	To Design T & L Shaped Retaining Walls,Combined Footings,Water

Able to perform various tests on aggregates and bitumen and access	Able to design the runway and its orientation using the wind rose
Choose a framework to evaluate the performance excellence of an	Develop Understand the basic concepts and technologies used in
Able to define stages of town planning and development through	Able to explain the importance of surveys and hierarchy of planning
Able to explain properties of hardened fibers like GFRC, SFRC	Able to explain ferrocement and Analysis and design of
Interpret the field data with reference to core recovery, RQD,	Recognize the erosion of tail channels to suggest the appropriate
Able to Design, analyze stability for various conditions for Earthen	Able to Classify and Design Canals using Lacey's and Kennedy's
Able to choose suitable method of valuation of property and	Able to explain execution of works in PWD and tendering.
Able to identify and analyse the risks involved in projects and	Able to explain material and human resource management in
Able to apply a basic project economics in construction industry	Able to apply different methods of analysis for project resource management and safety norms to the construction project
Able to describe technique and equipment to control of air pollution.	Able to describe land use planning as a method of air pollution control.

and III

CO4	CO5
Students will be able to understand the algorithms of mechanical engineering related software packages	

Develop Understand the basic concepts and technologies used in the field of management information systems.	economical span. Identify the components of a bridge and their Suitability under different
To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution.	Evaluate and measure the performance of a algorithm using modern methods of optimization..
Able to understand the benefits of climate change mechanisms	Able to evaluate different Energy efficient projects
Understand and apply research approaches, techniques and strategies in the appropriate manner for decision making.	Able to prepare a project proposal

CO6	CO7
CO6	CO7
Analyze axially and eccentrically loaded column	
Compute the lateral thrust due to backfill on the retaining walls	Classify soil slopes and identify their modes of failure
Explain different materials especially eco-friendly materials and safety measures to be adopted at any construction site	
Design pipes to carry particular amount of discharge	
Apply plastic analysis for indeterminate steel structures by limits state method.	
Interpret geohydrological characters of the rocks present at the foundations of the dams, percolation tanks and tunnels	Understand Seismic activities and its effect on the civil engineering construction.

Predict deteriorations in concrete and repair it with appropriate methods and techniques.	
CO6	CO7
Understand the concepts involved in finite analysis methods to	
Able to design an industrial steel building using I.S 800;2007	
Able to explain components of hydropower plants and	Able to differentiate the GVF profile and its computations in
Able to characterize the various terms related to reservoir planning.	Able to explain the lift irrigation schemes and process of water
Able to describe and analyse different types of earth moving	
Able to design column and column footing of G+2 storey building.	
Able to explain application of geo-synthetics and different earthquake	
able to describe water distribution systems and Rain water harvesting	Able to draft reports concerned with testing of water samples and
Able to evaluate conditions for project appraisal and preparation of	
CO6	CO7
Able to explain industrial waste water treatment facilities.	Able to draft reports concerned with testing of sewage and effluent
To Study Earthquake loads by seismic coefficient method-	

Able to calculate the various elements of a bridge like afflux, economical span. Identify the components of a bridge and their	
Aware of the acts related to the planning of a region and a town	
Apply rock mechanics systems for evaluating tunnels, bridges, dams	
Able to classify and analyze the necessity of various types of CD	
Able to illustrate meaning, validity, the conditions and laws of contract.	
Able to explain basic terminologies and applications of artificial	
Able to evaluate conditions for project appraisal and preparation of project feasibility report as well as detailed project report	
Able to describe and explain the environmental impact assessment and management	

CO6	CO7

Understand optimization techniques using Topology Optimzation & ESO Evolutionary Structural Optimization methods.	
Able to understand the Clean development mechanism for energy conservation projects	
Write a research report and thesis	

Able to understand Environment friendly building and



Program

PO-1	Apply the knowledge of mathematics, science, and engineering fundamentals.
PO-2	Identify, formulate, and analyze complex engineering problems.
PO-3	Design solutions for complex engineering problems for the public good.
PO-4	Conduct investigations of complex problems to provide valid conclusions.
PO-5	Make use of Modern tools to complex engineering activities with confidence.
PO-6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and ethical issues, and communicate complex engineering information.
PO-7	Understand the impact of the professional engineering solutions in society and environment.
PO-8	Apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering profession.
PO-9	Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
PO-10	Communicate effectively on complex engineering activities with diverse audiences.
PO-11	Demonstrate knowledge and understanding of the engineering and technology in the context of the global and societal context.
PO-12	Engage in independent and lifelong learning in the broadest context of continually evolving global issues.

Program Specific Outcomes

PSO-1	Able to analyze and design of various civil engineering structures.
PSO-2	Able to understand and apply the concepts of fluids, and flow.
PSO-3	Able to plan different types of building and to develop the layout.
PSO-4	Able to understand and apply the concepts of surveying and





Program Outcomes

fundamentals to complex engineering problems.

health and safety, the cultural, societal, and environmental considerations.
conclusions.

an understanding of the limitations
societal, health, safety, legal and cultural issues.

1 societal and environmental contexts.

abilities and norms of engineering practices.

1 diverse teams and in multidisciplinary settings.

the engineering community and with social at large.

l management principles.

f technological change.

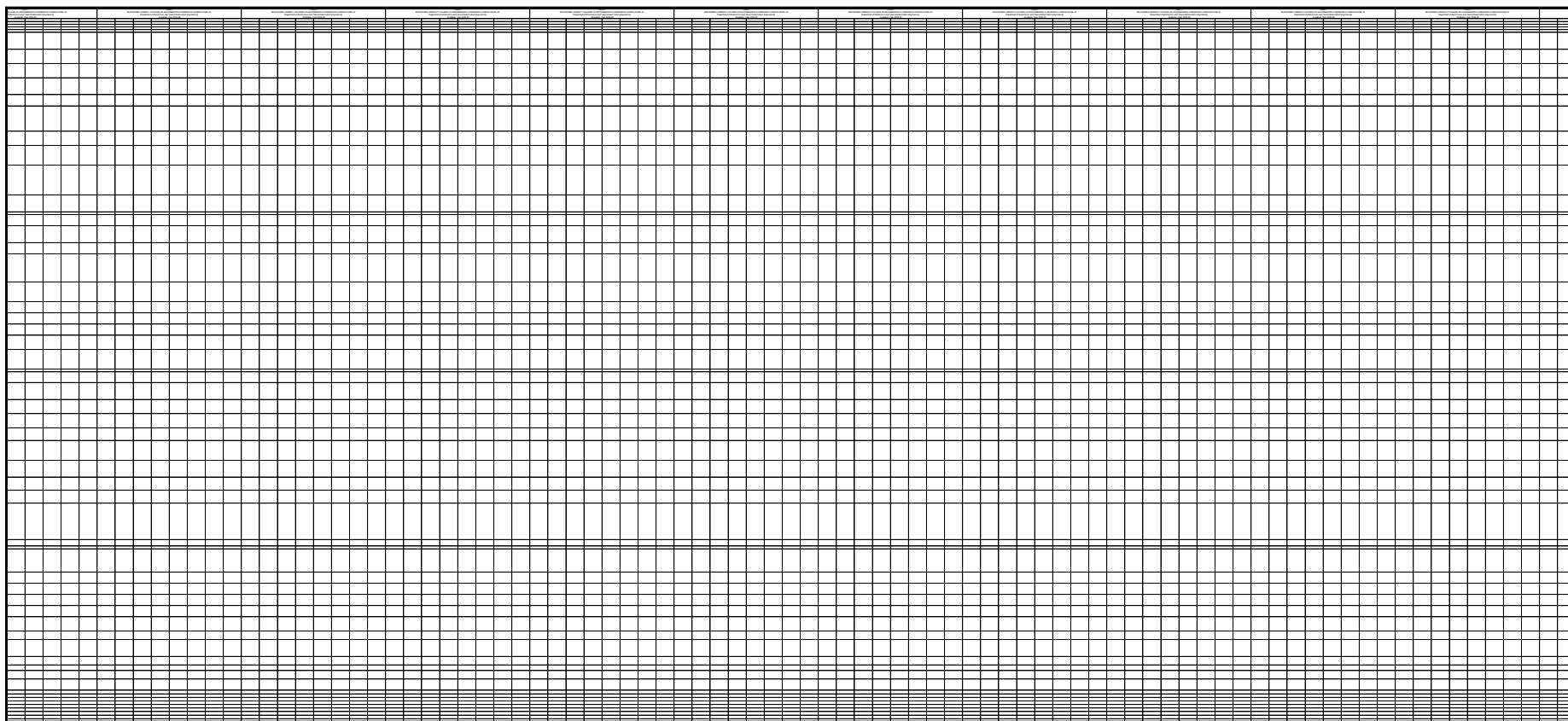
Outcomes (PSO)

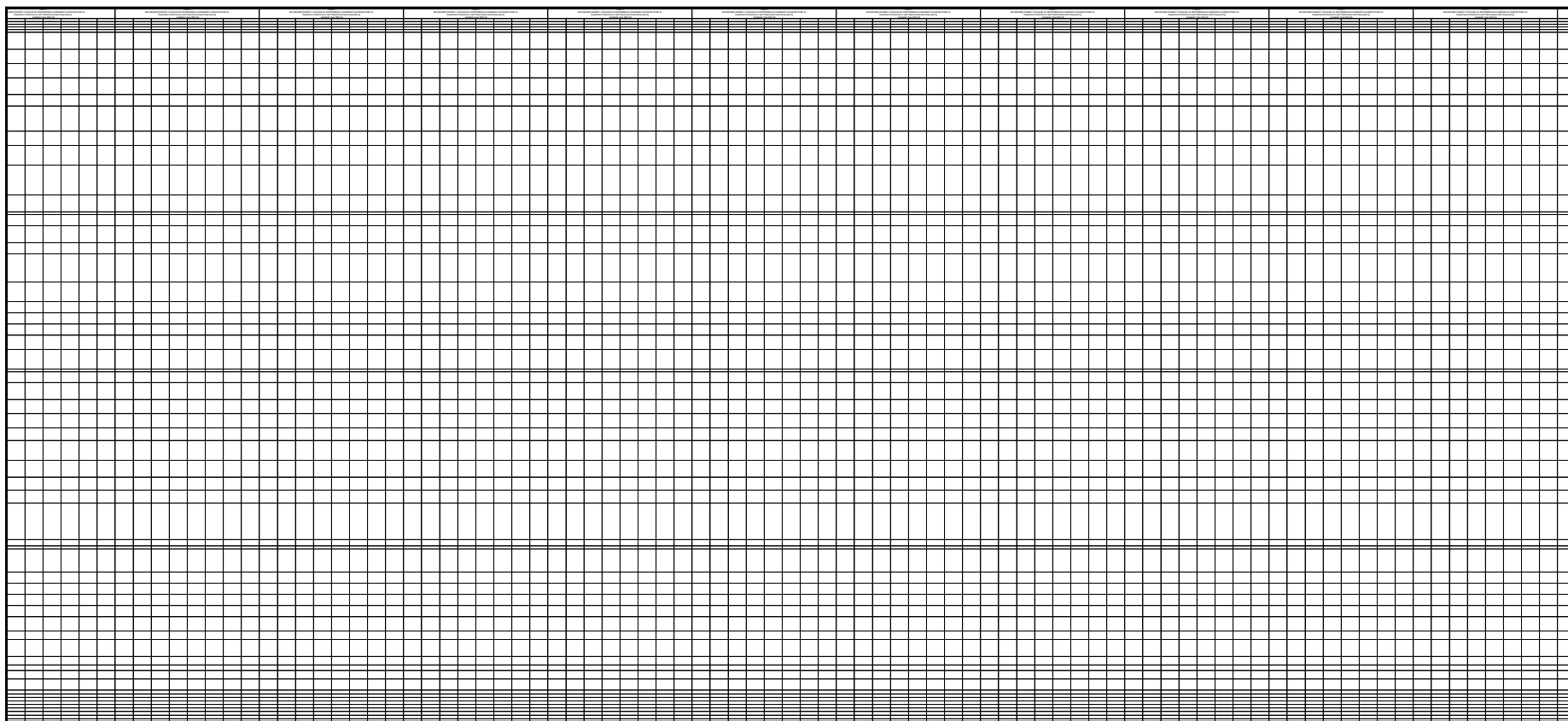
structures like buildings, bridges, water tanks, retaining walls subjected to sta
w phenomena to carry out analysis & design of hydraulic structures like
gic for management of construction projects.

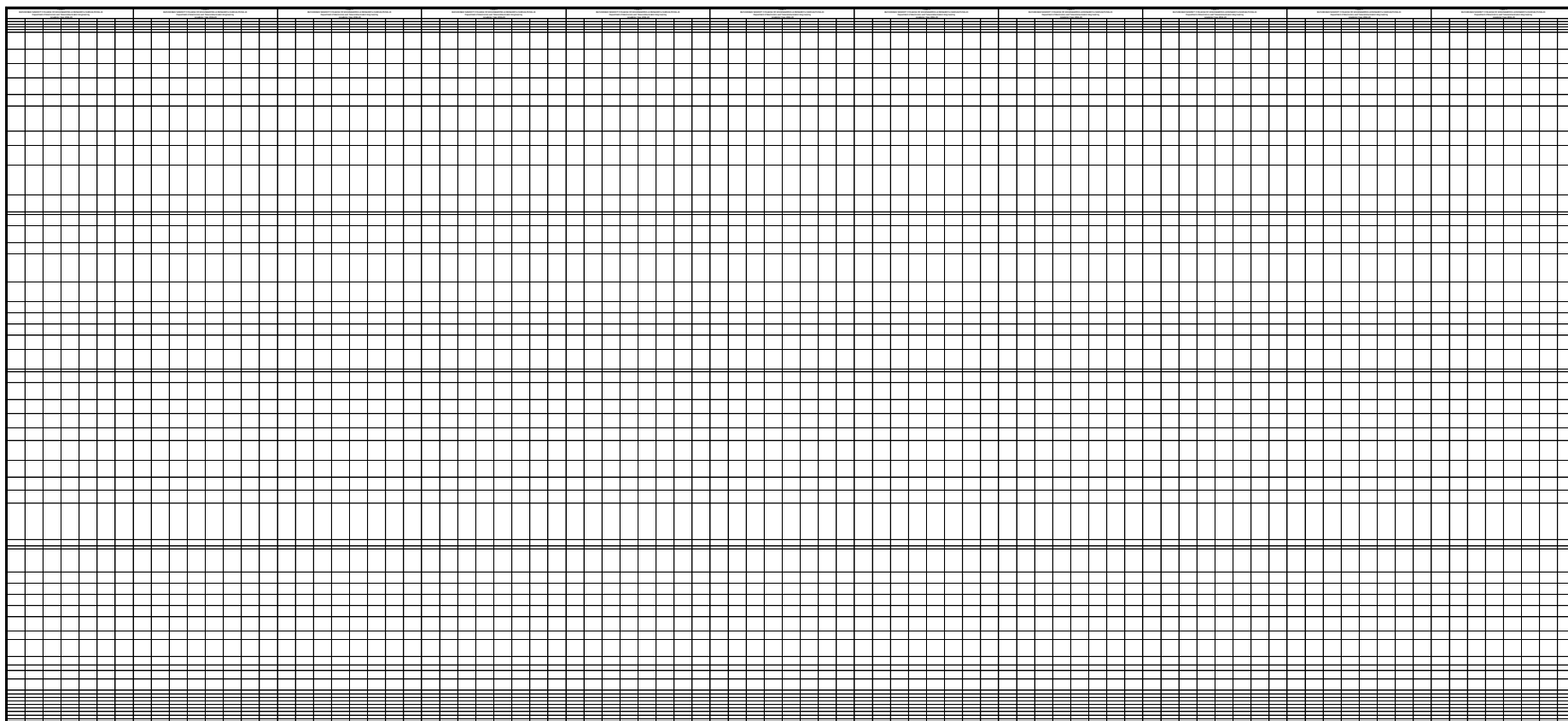
d leveling and to carry out various investigations like geological and geot

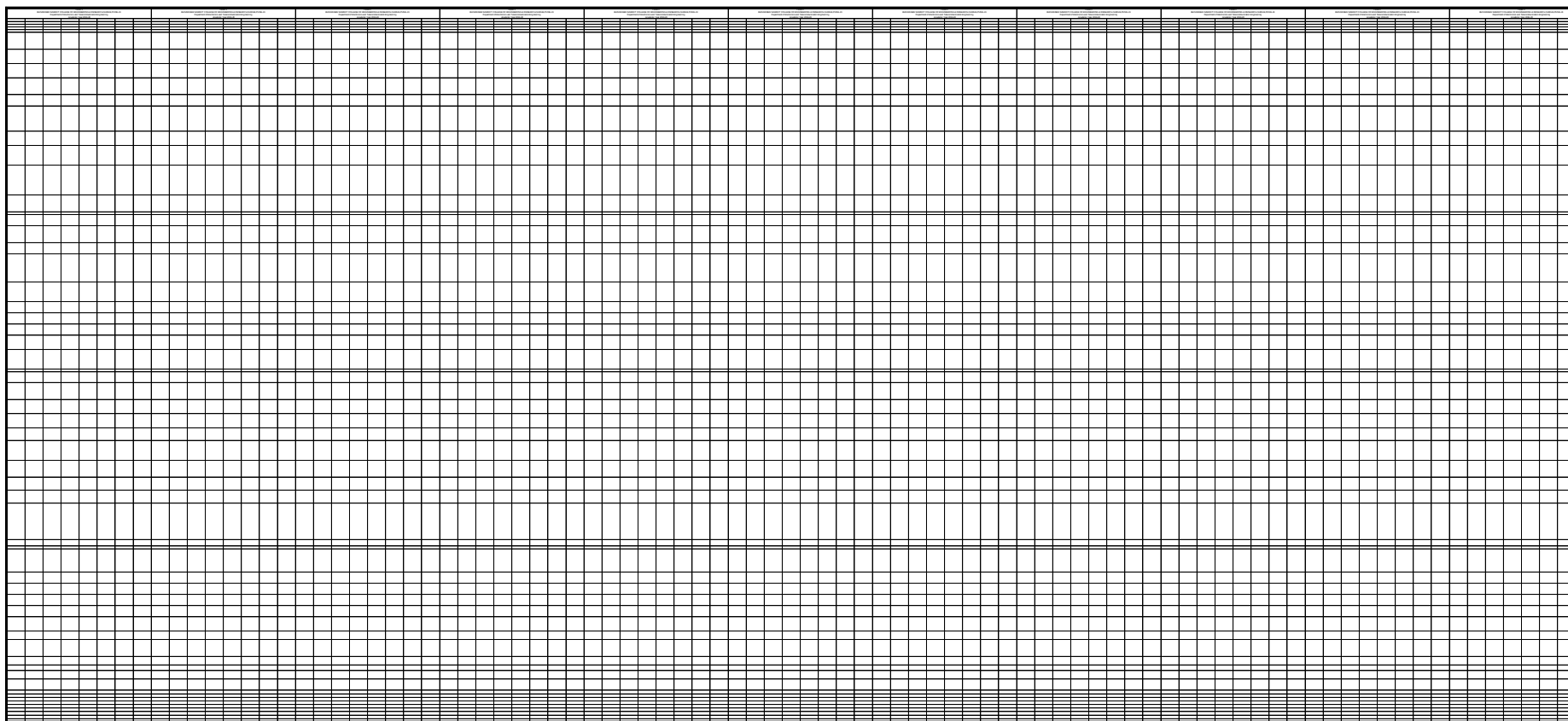


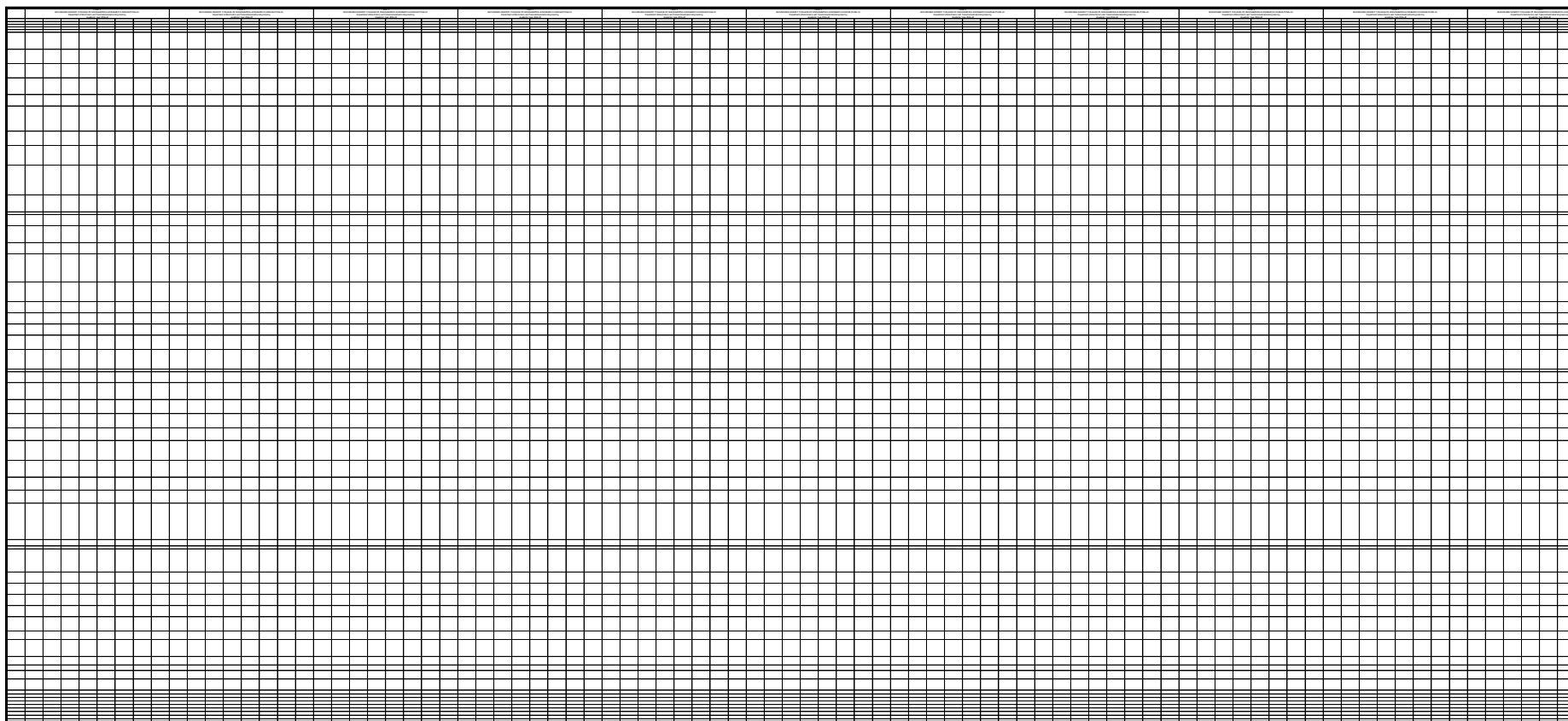
technical for construction of various structures like roads and buildings.

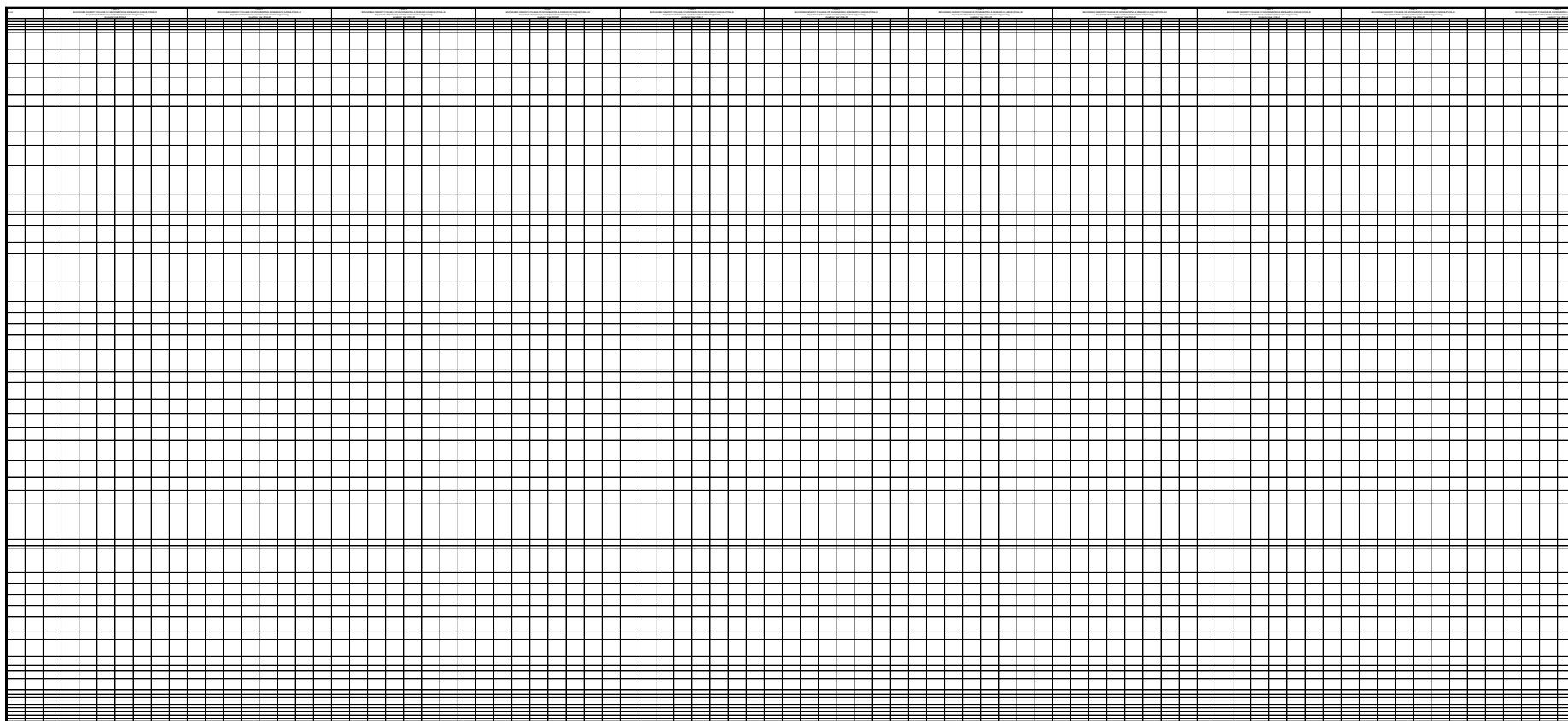


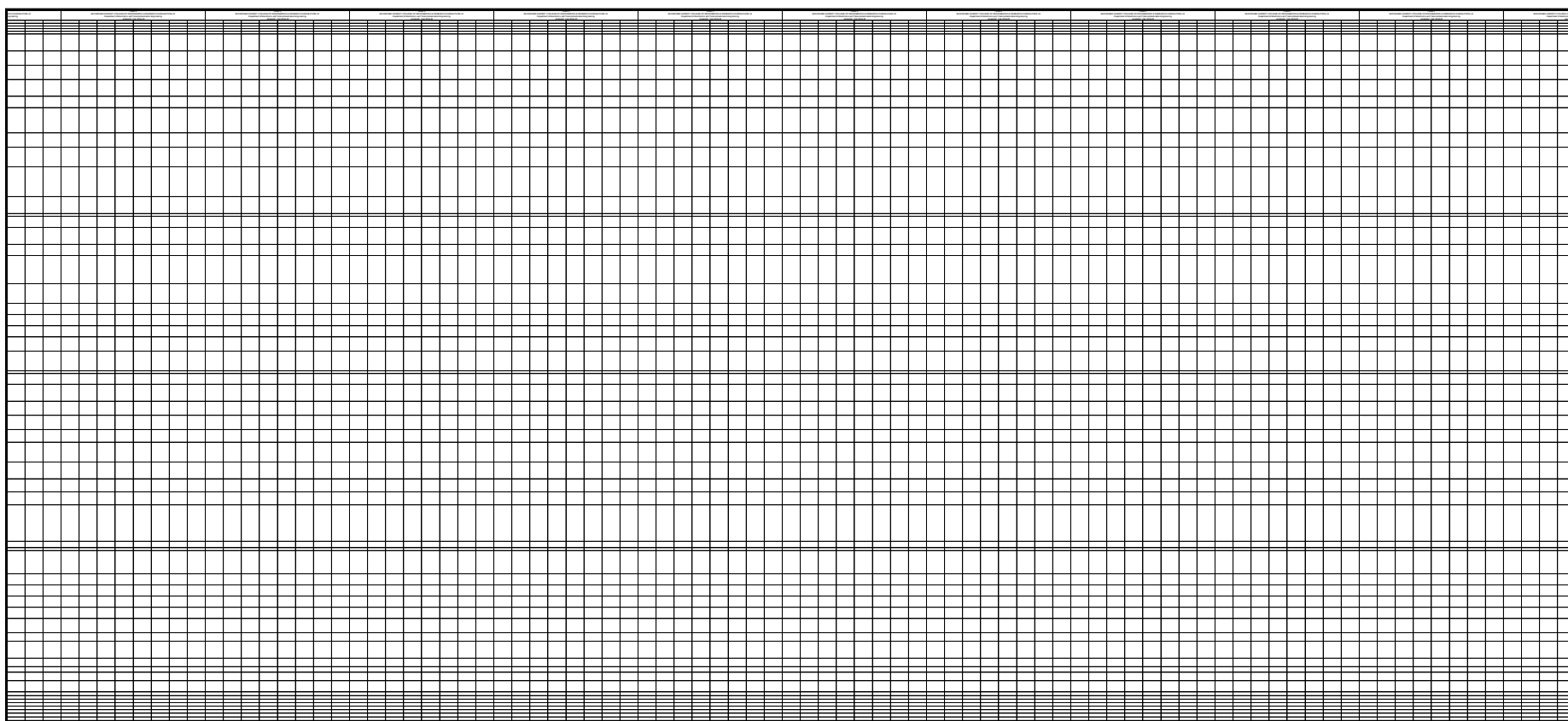


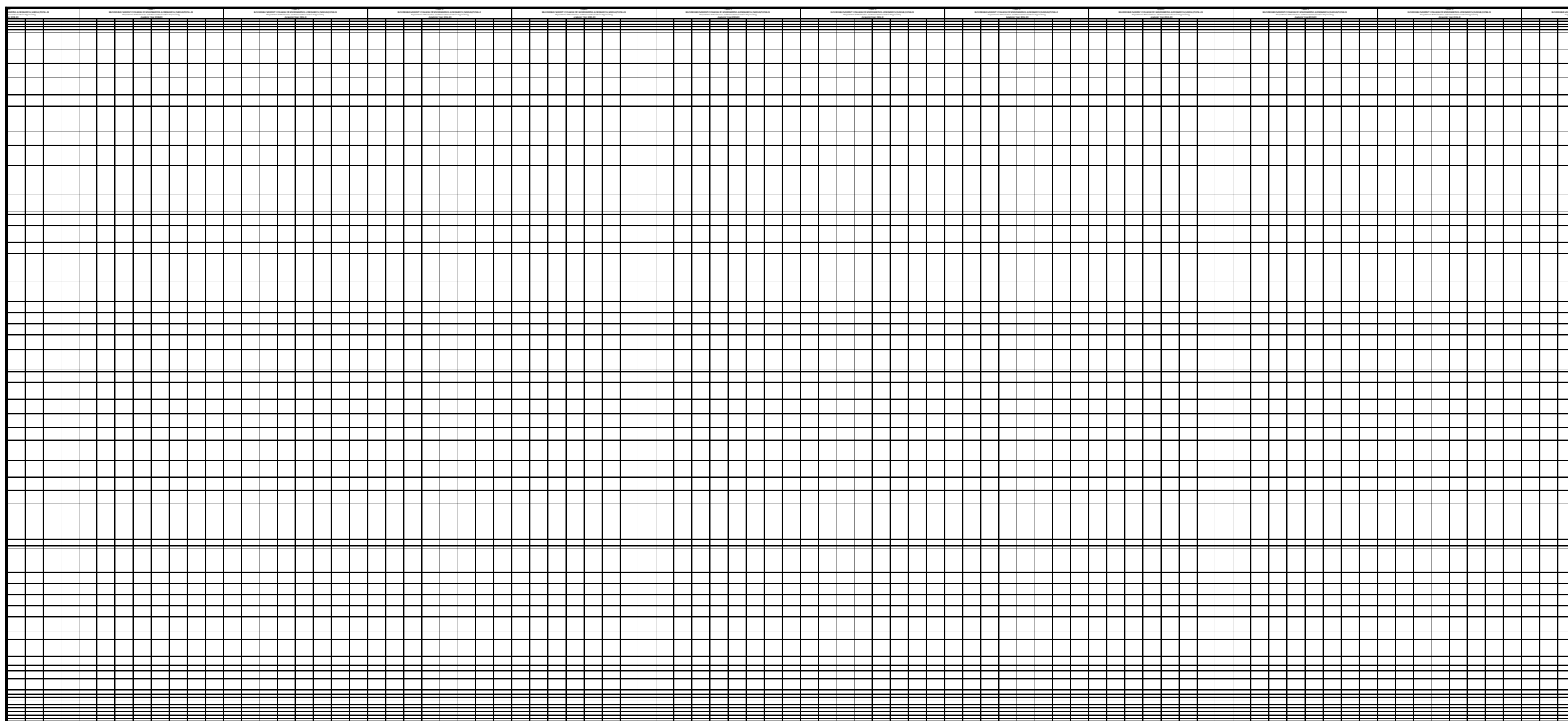


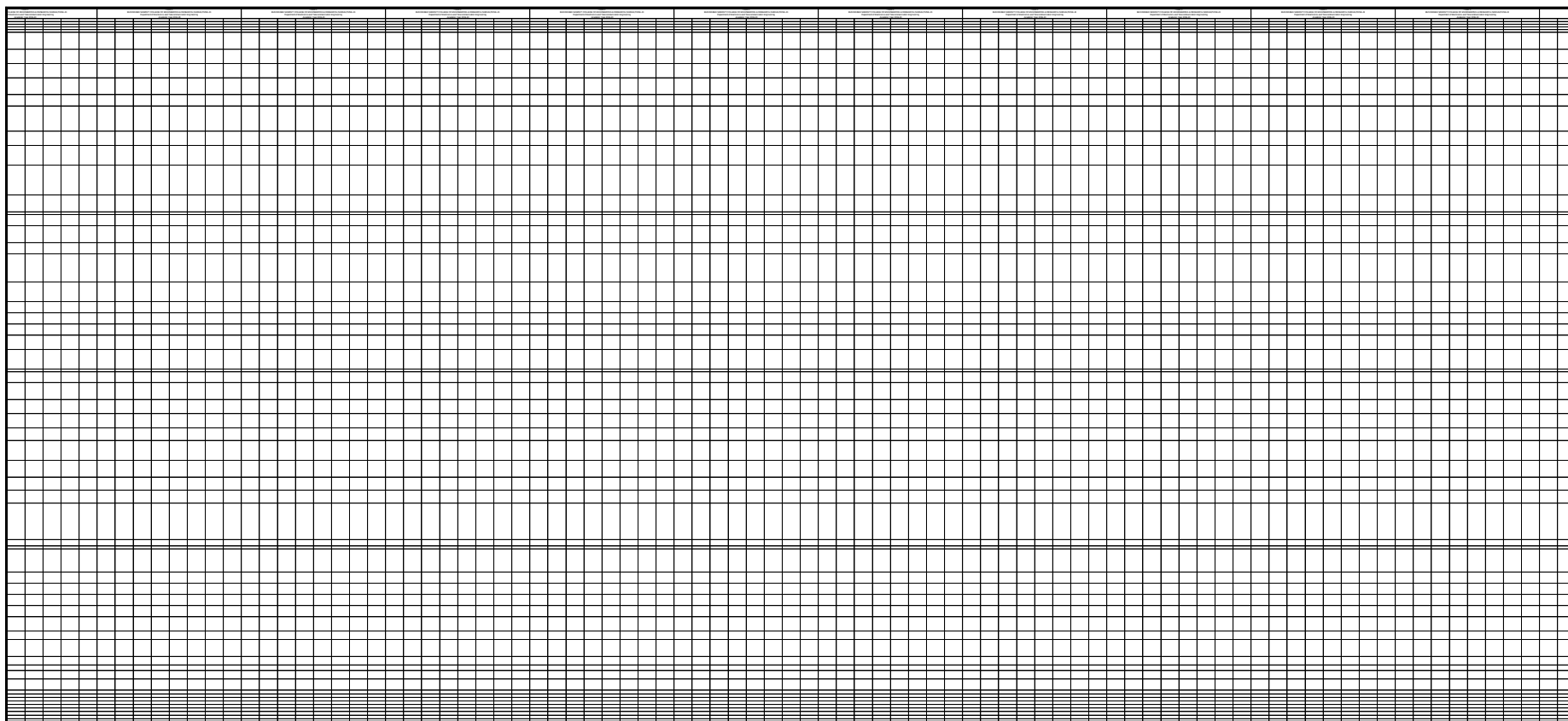


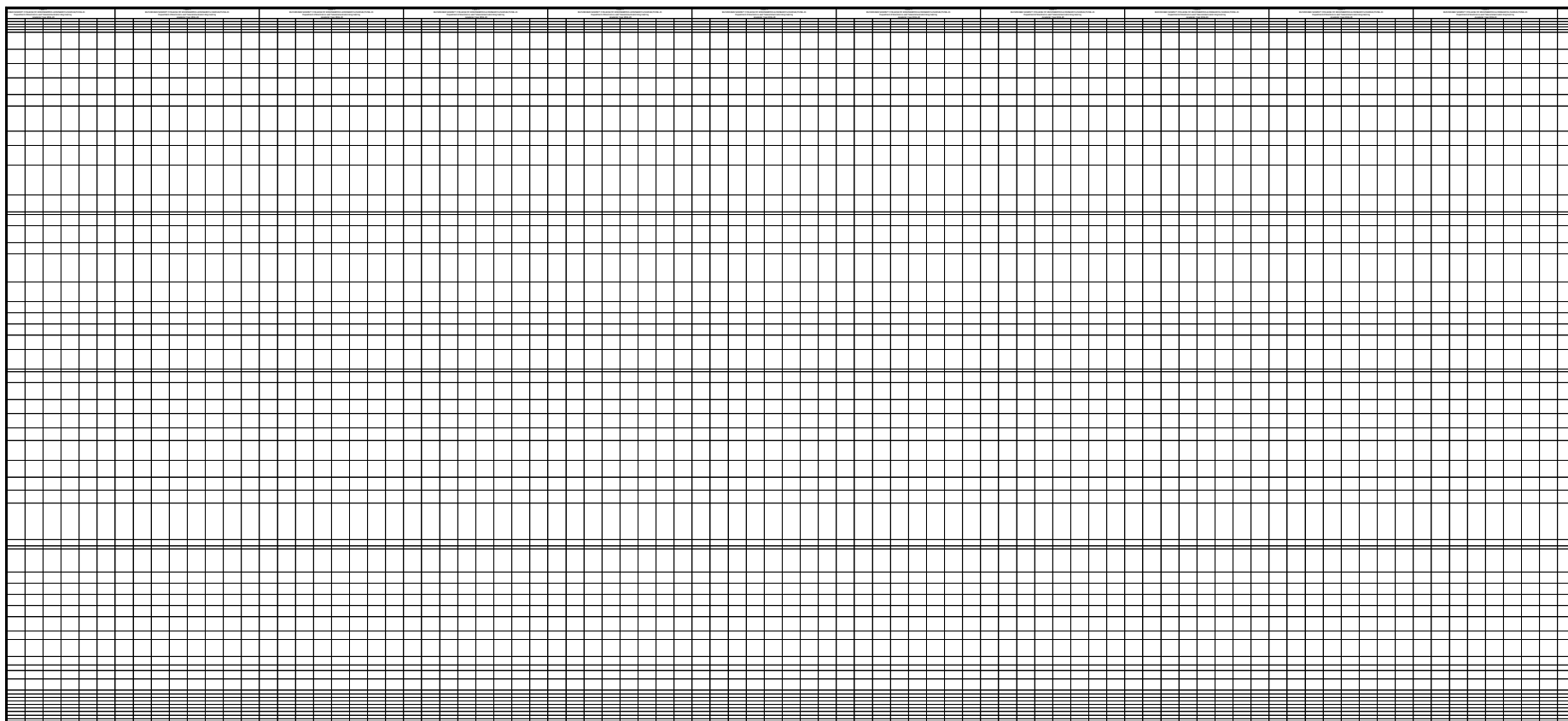


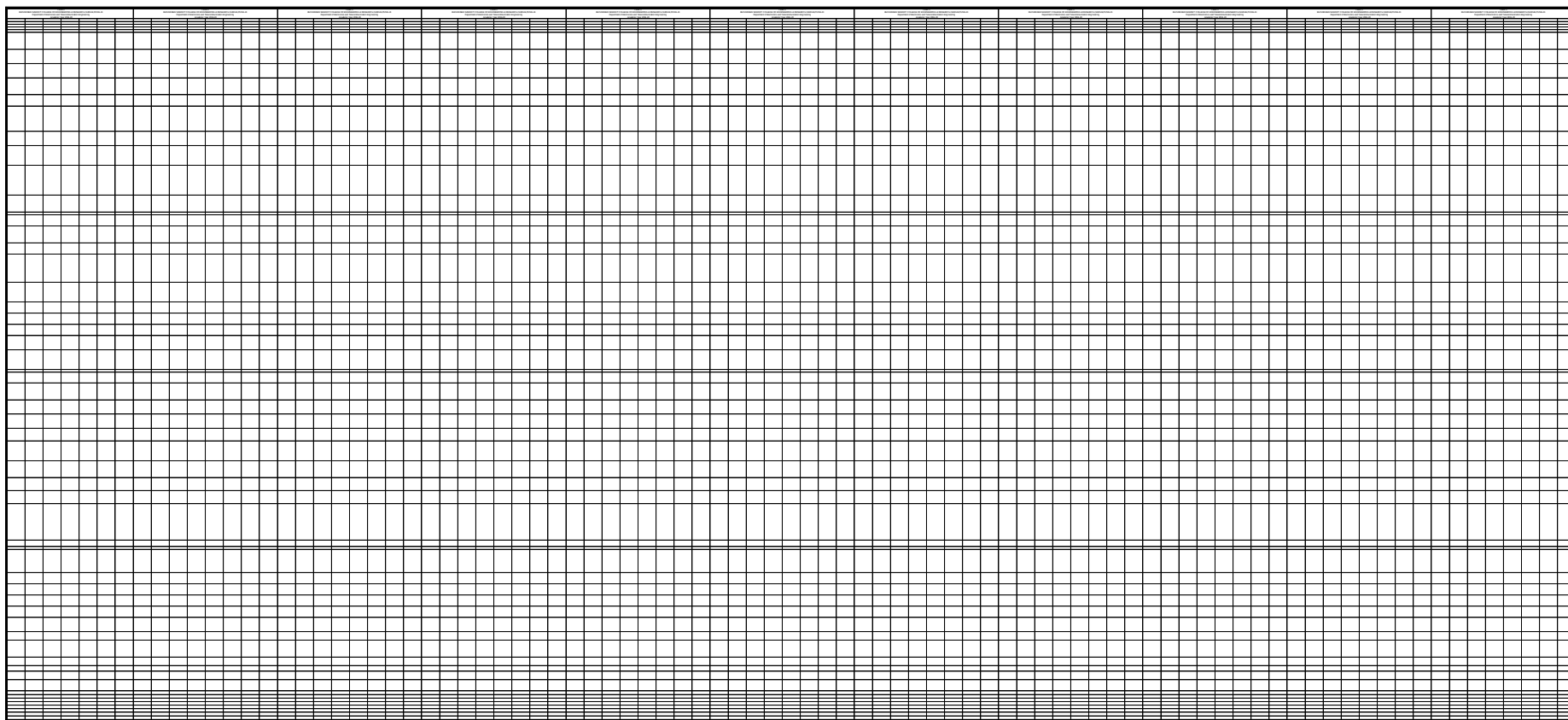


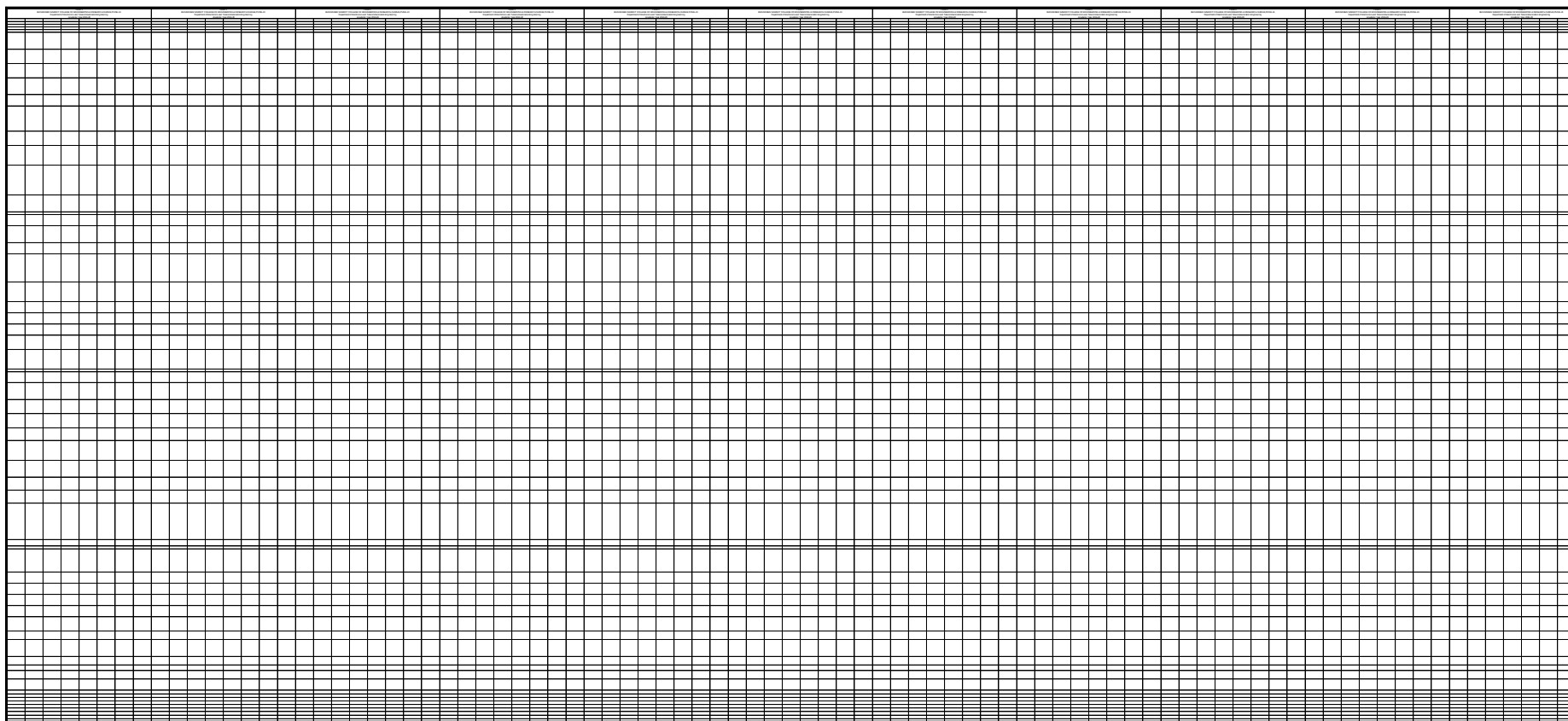


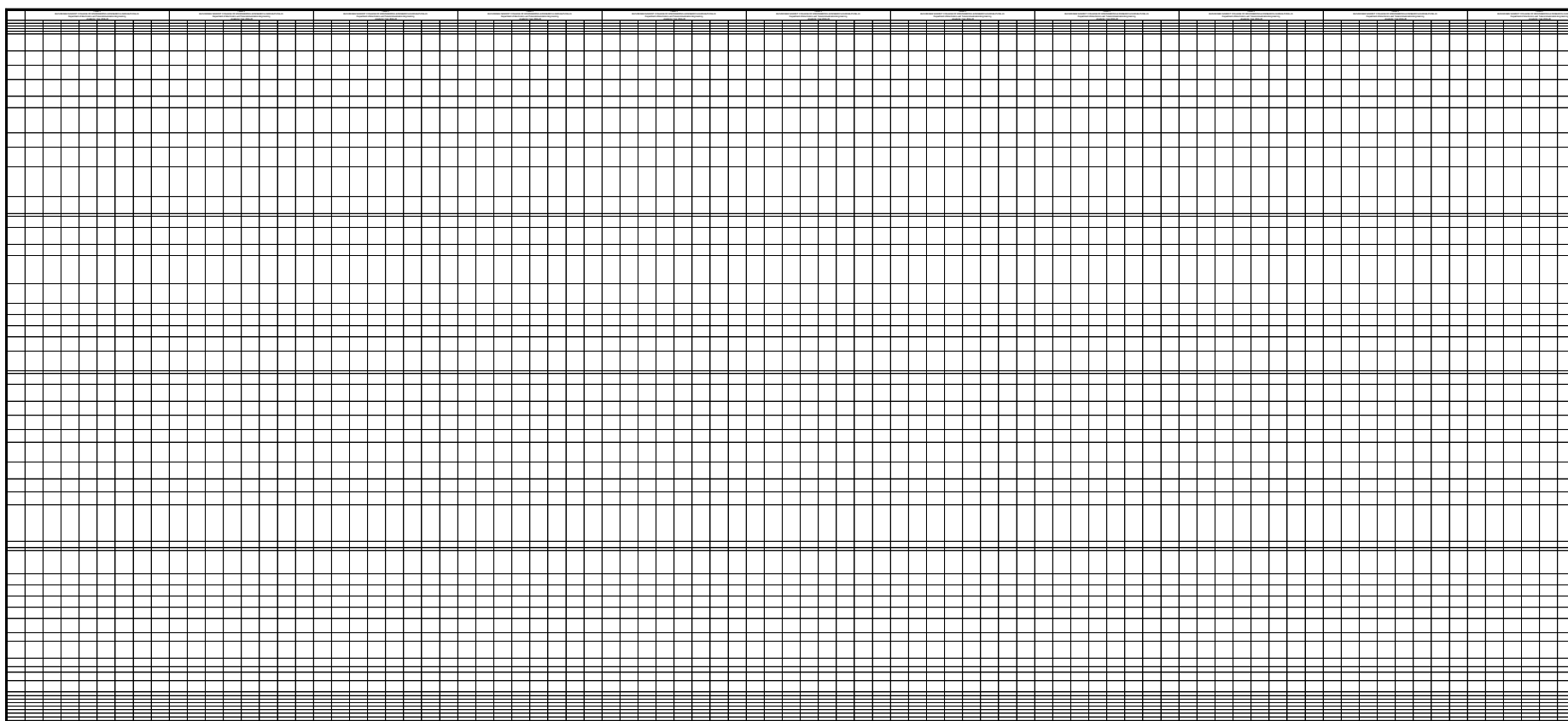


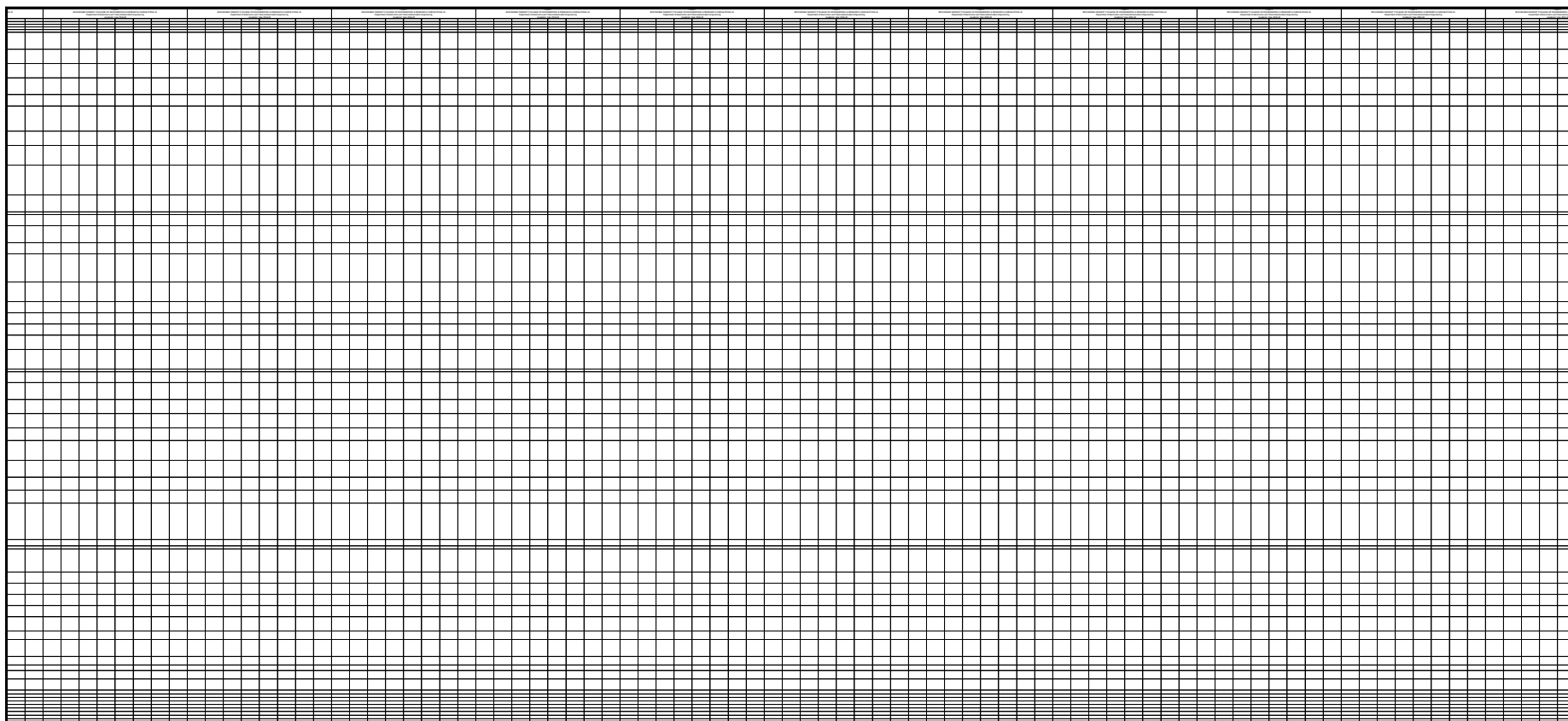


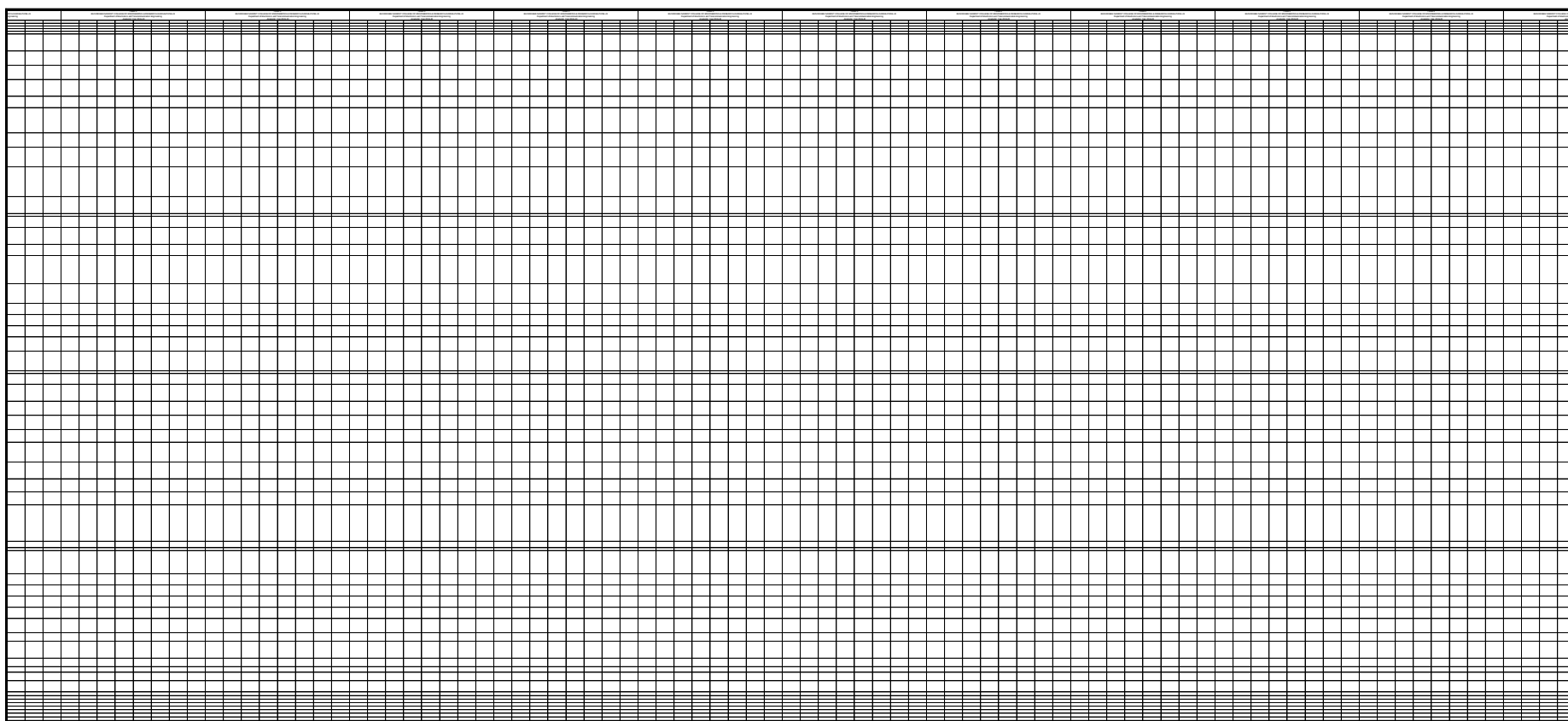


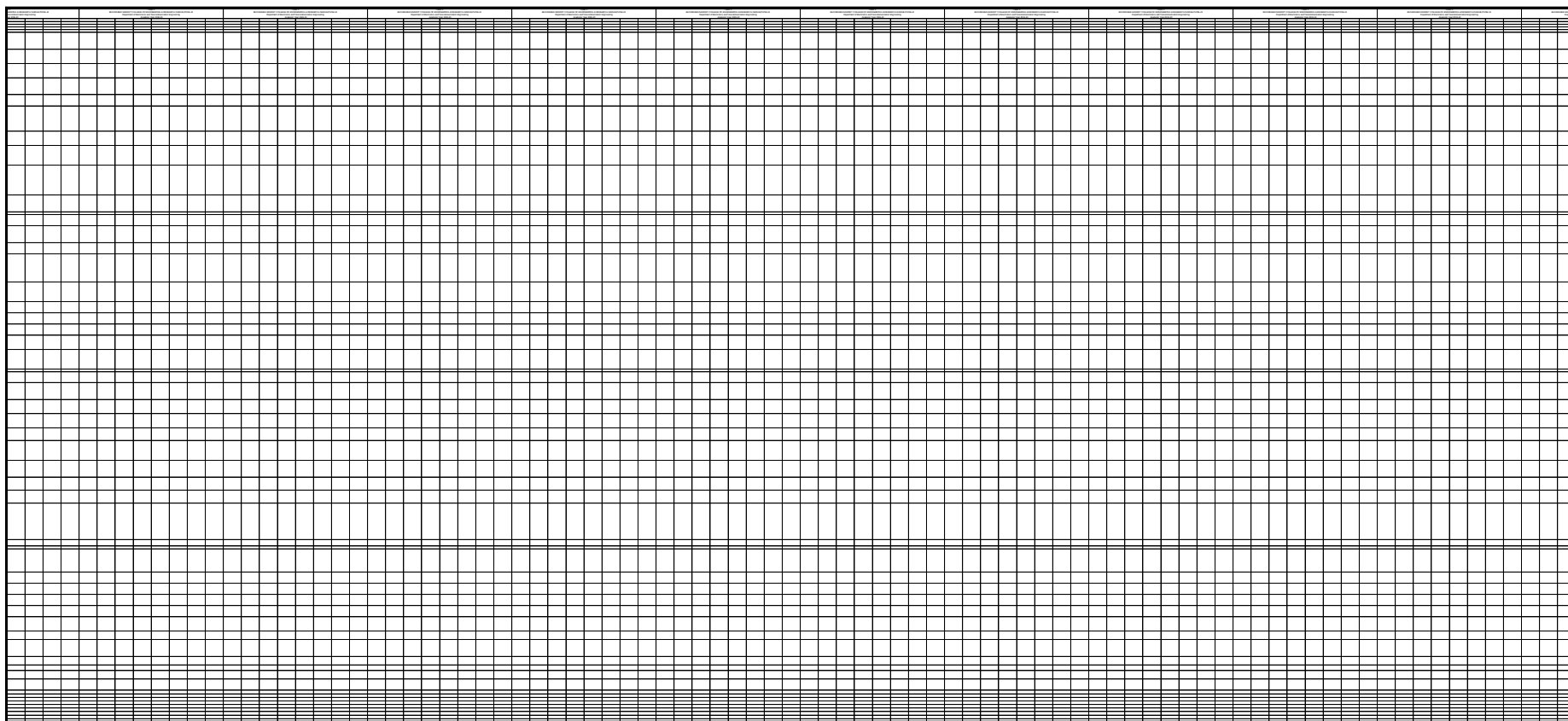


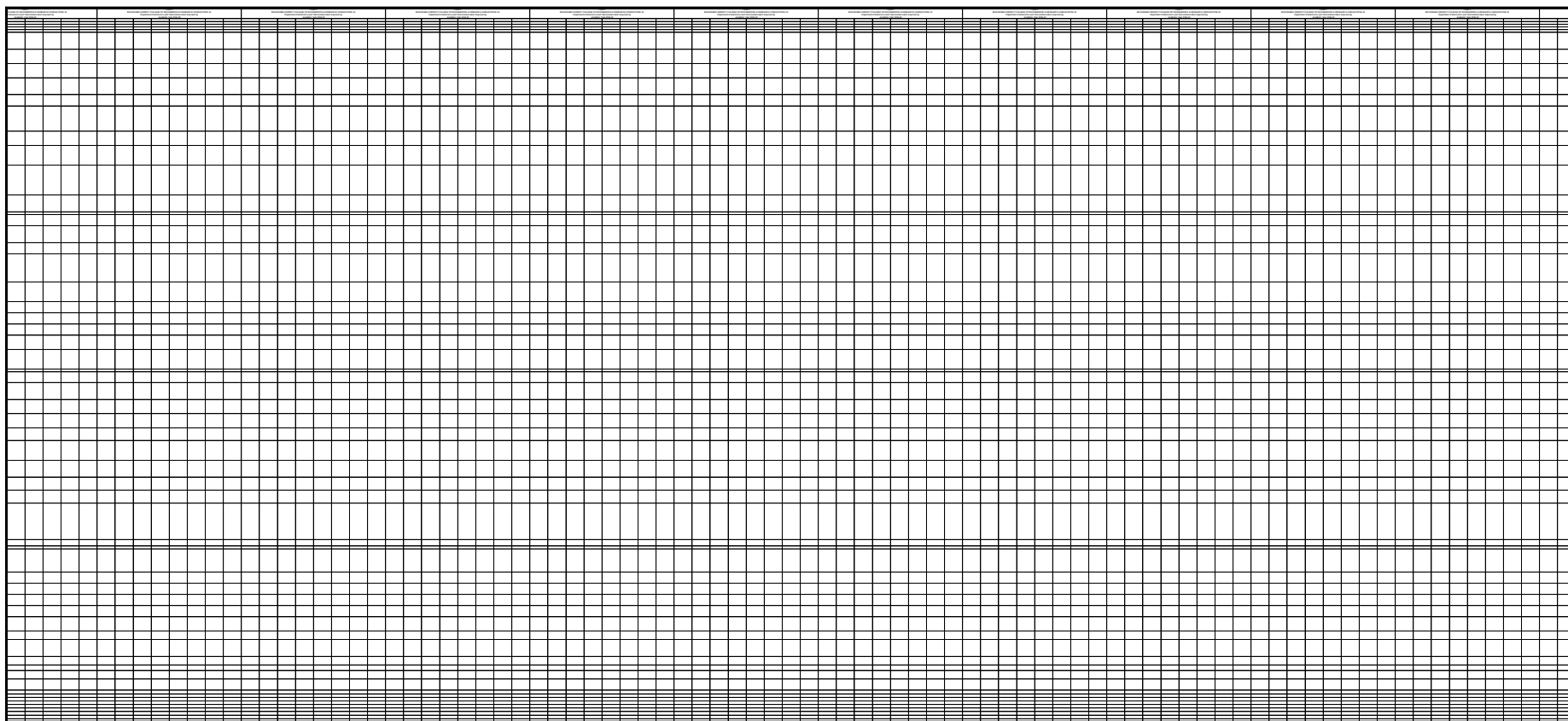


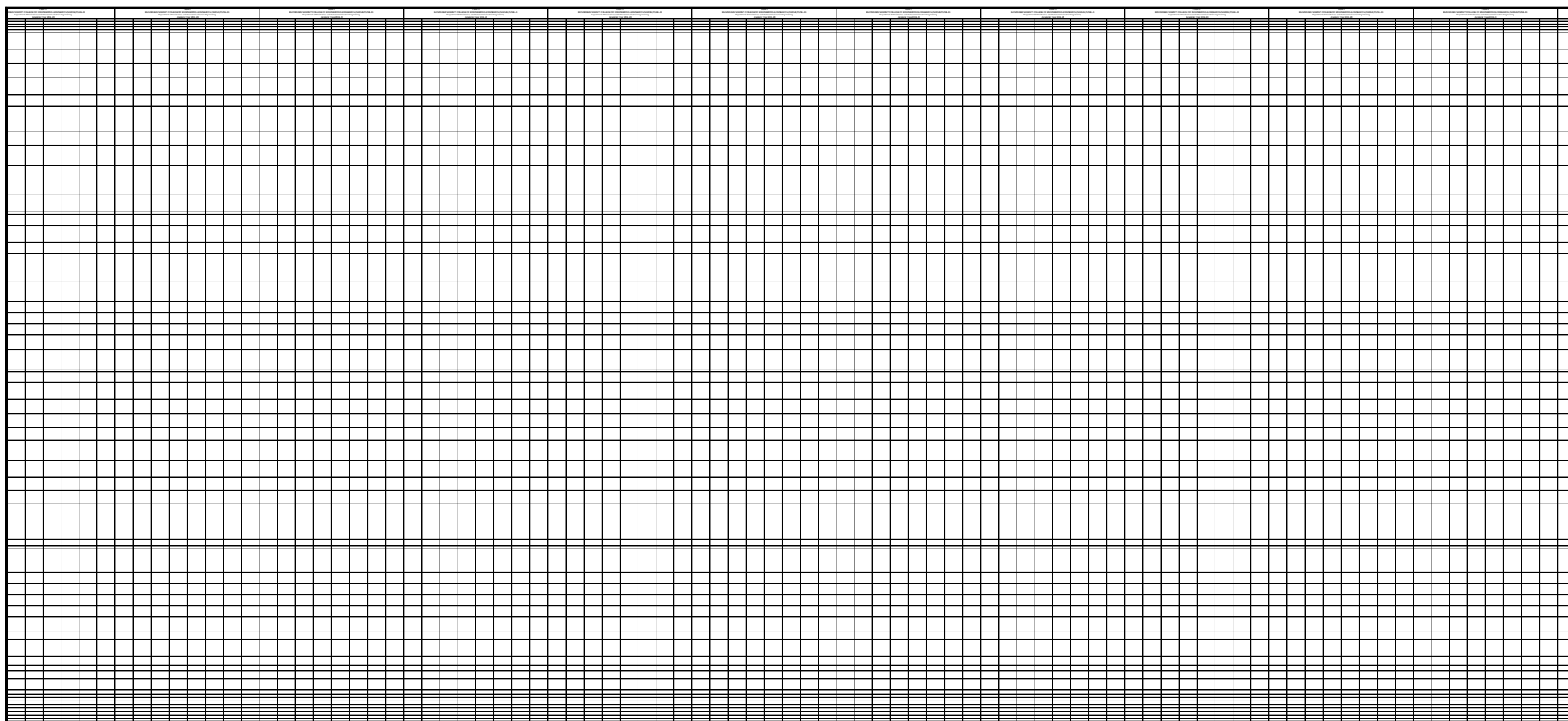


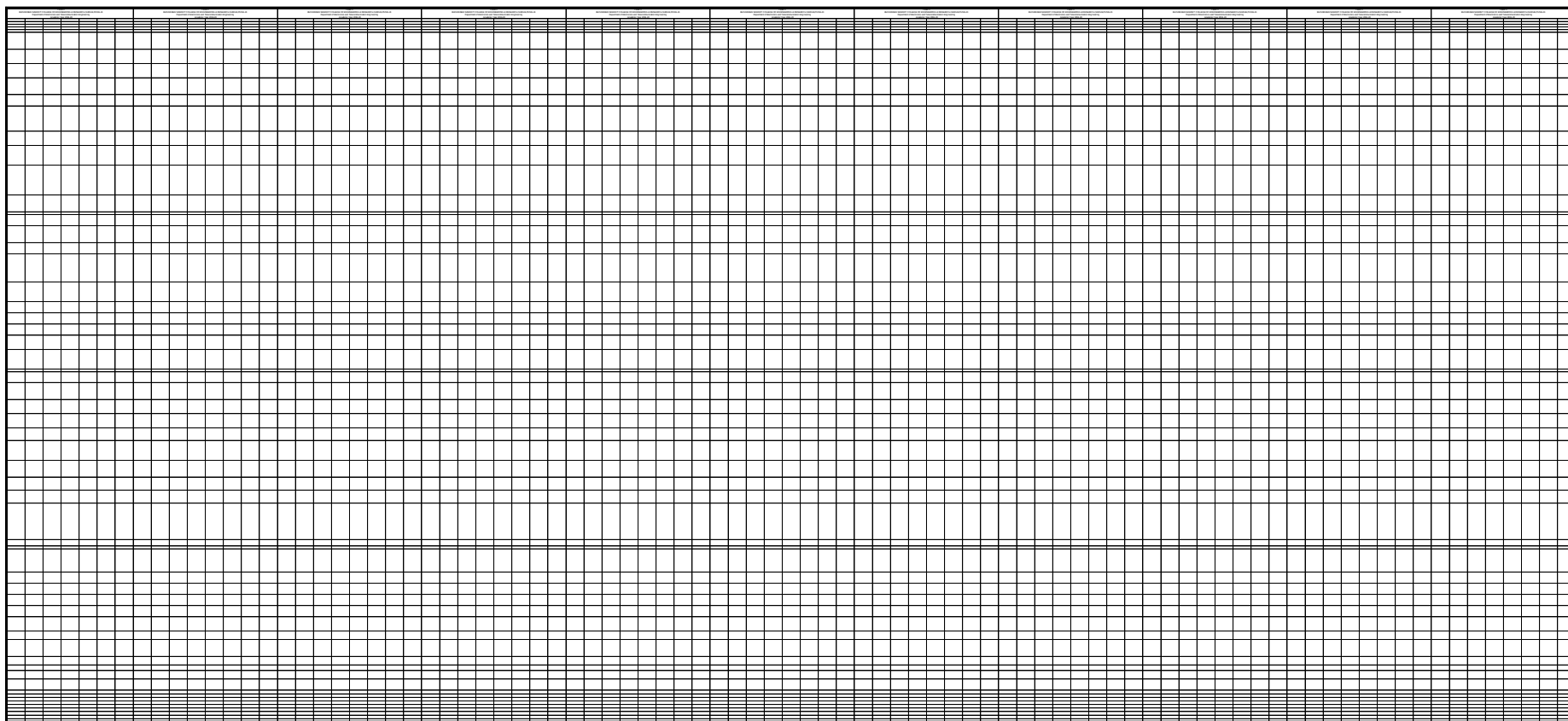


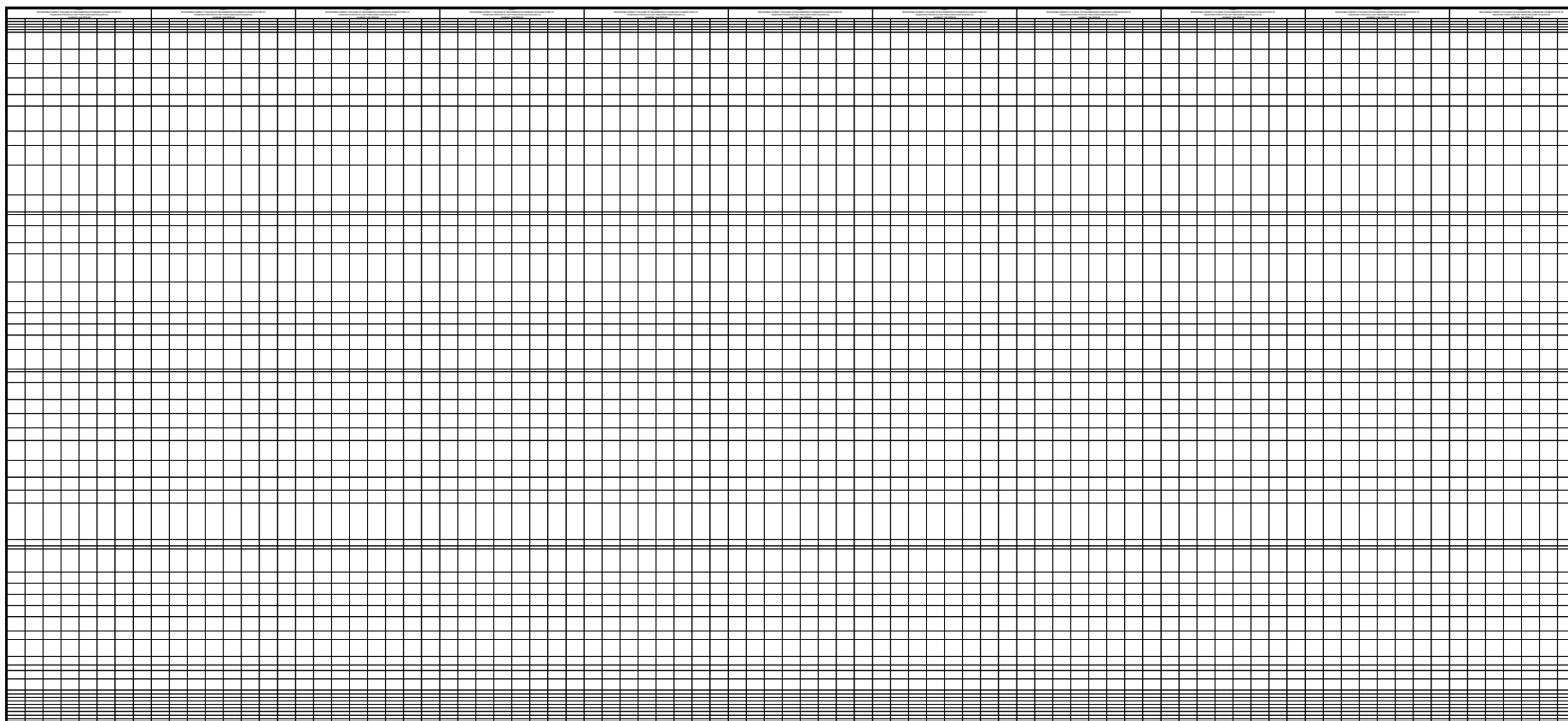


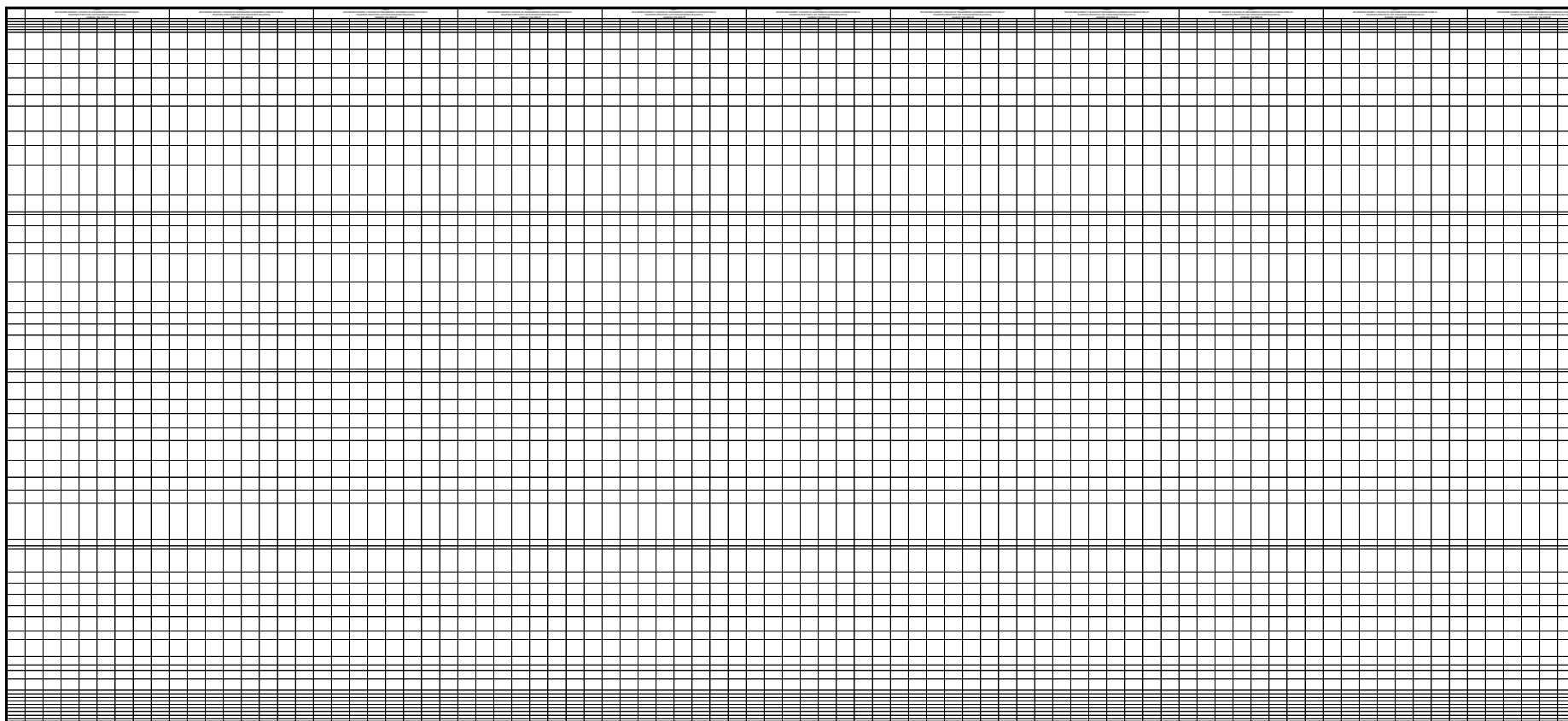


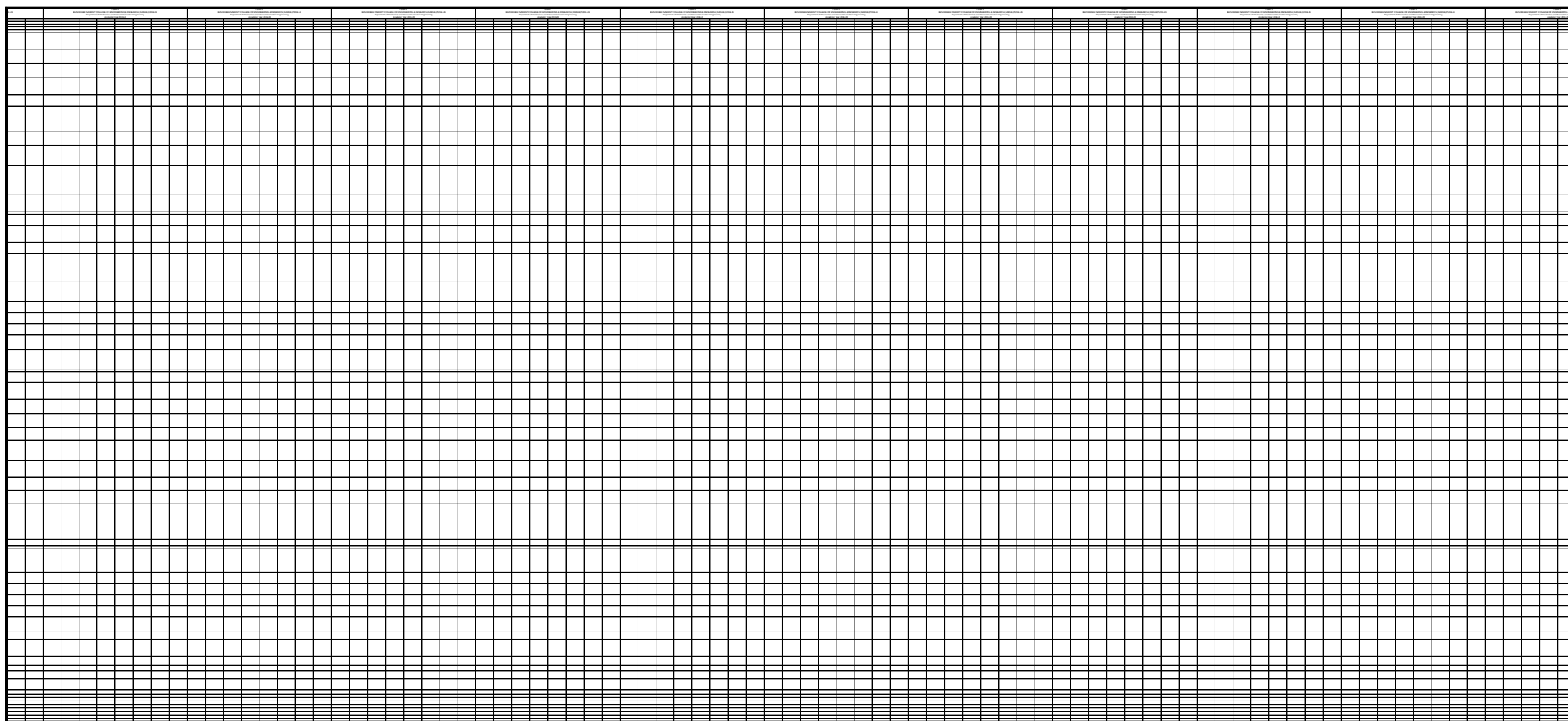


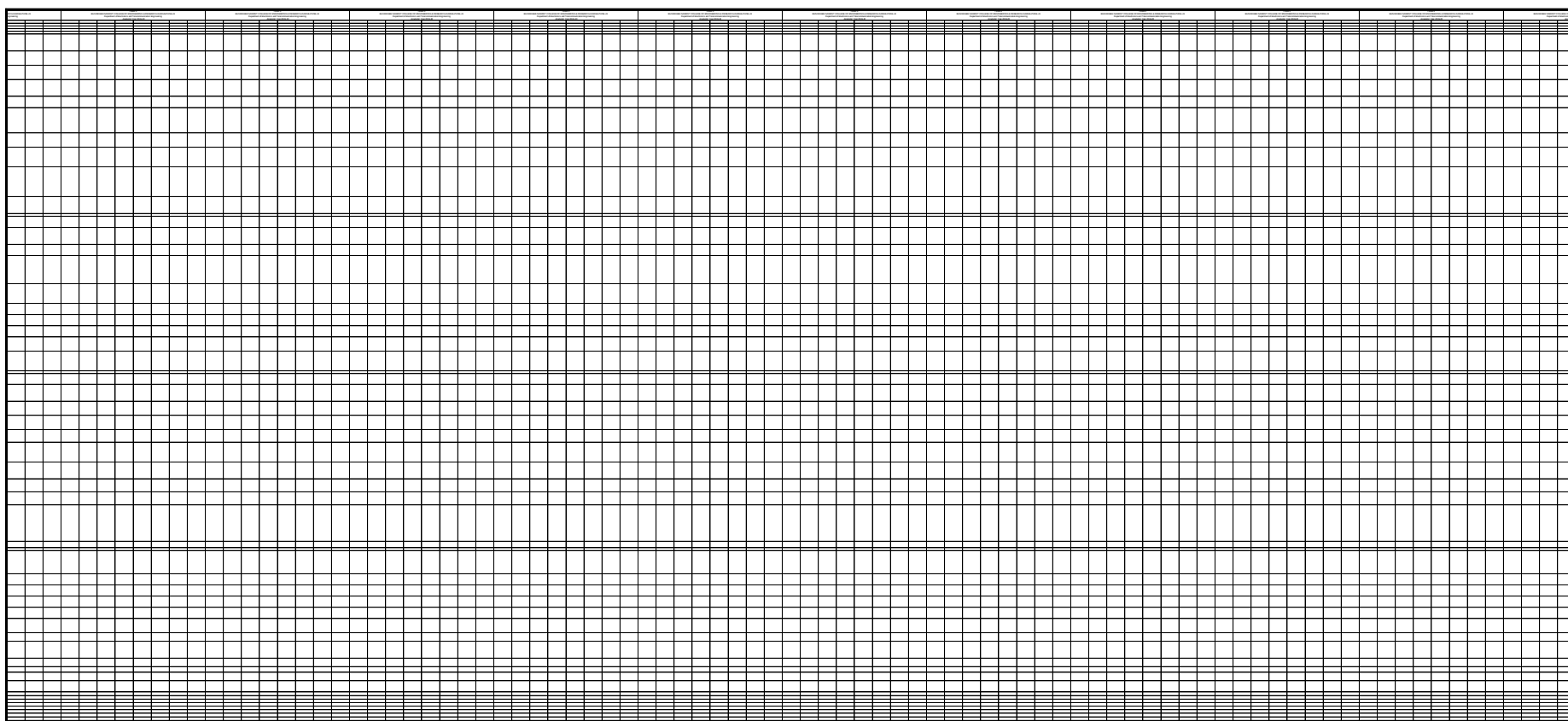


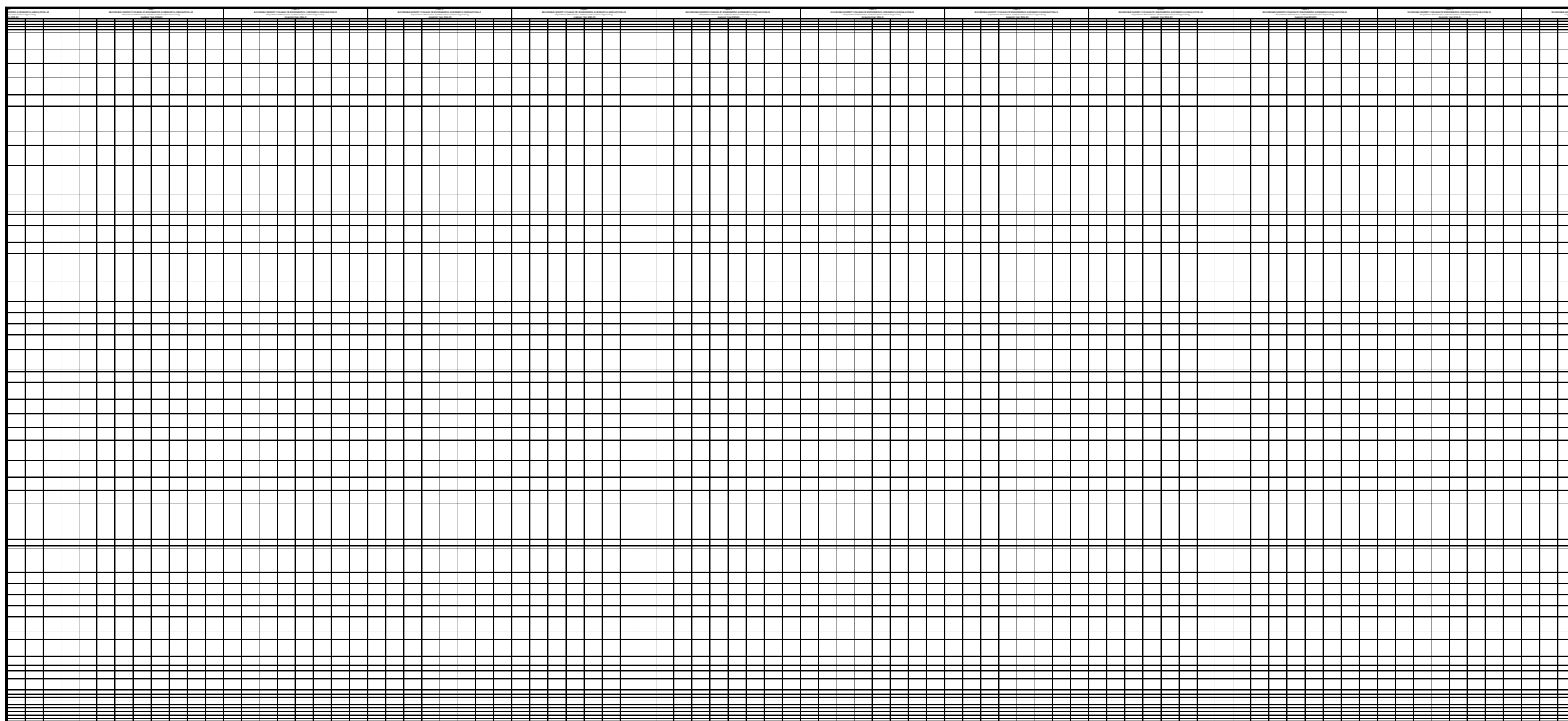


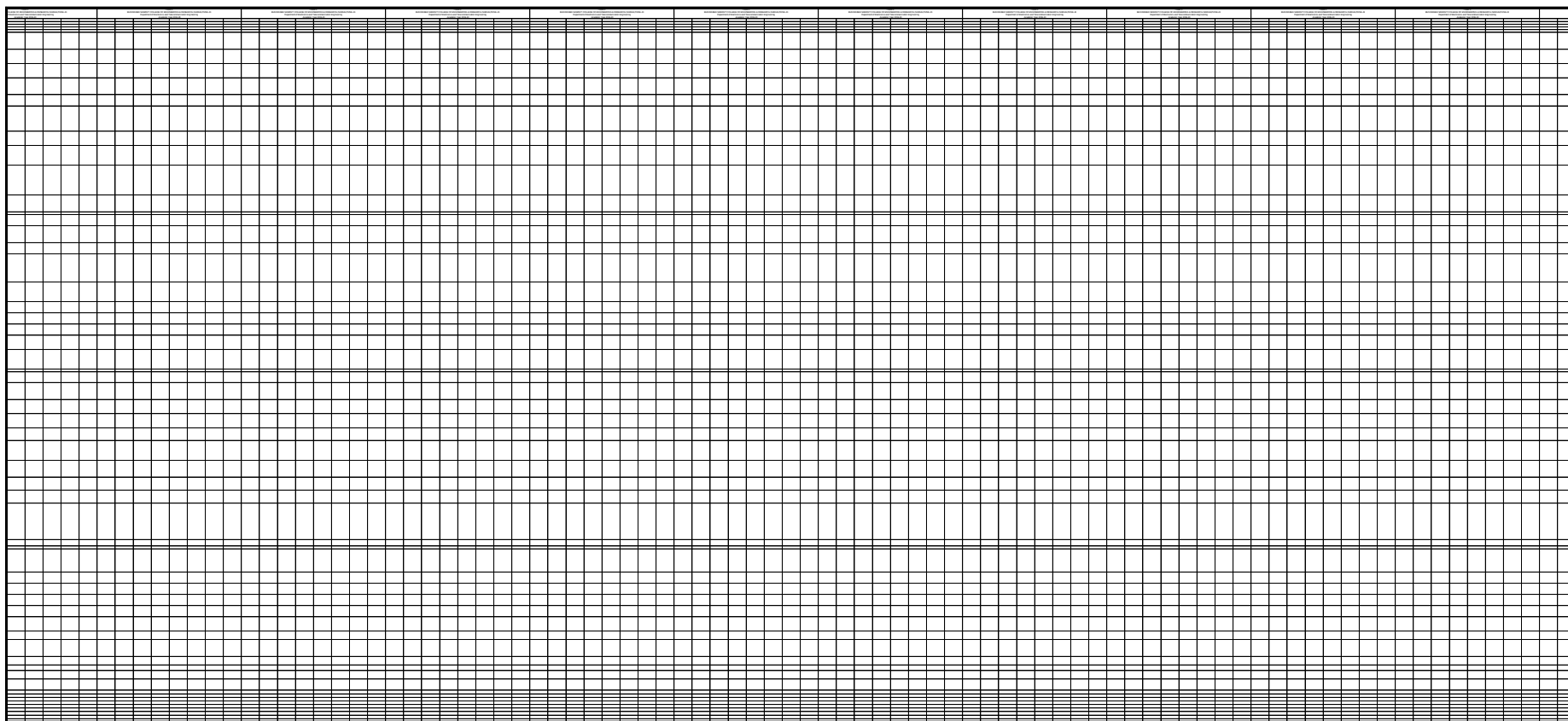


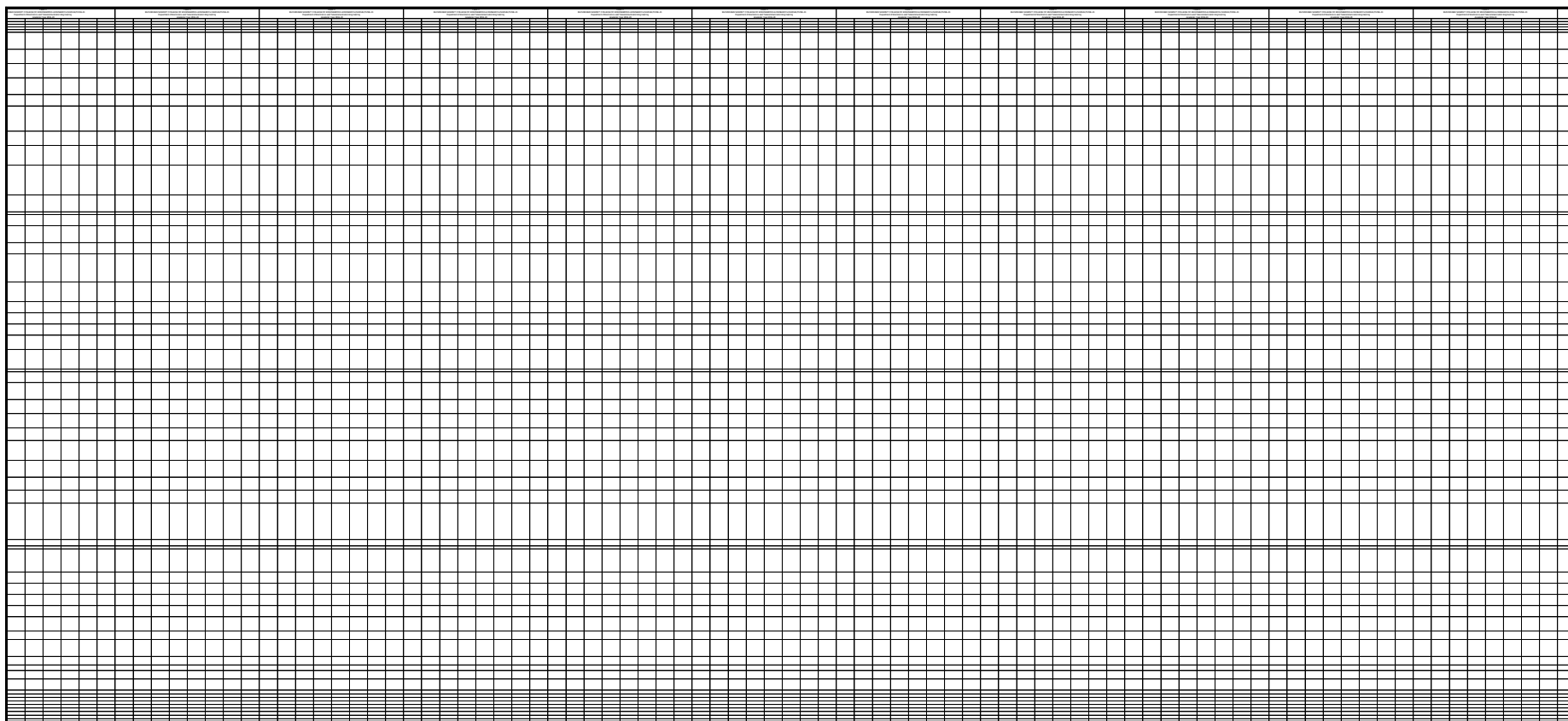


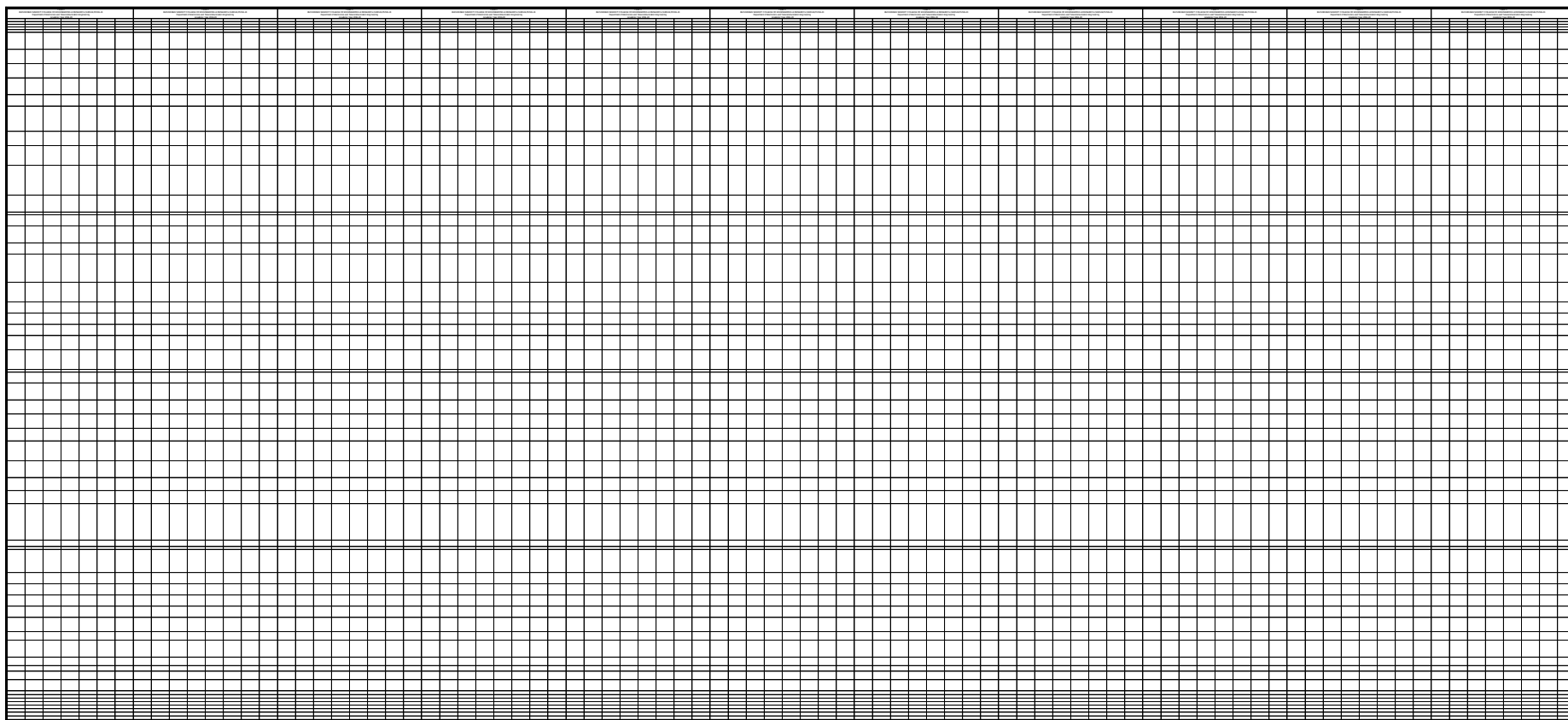


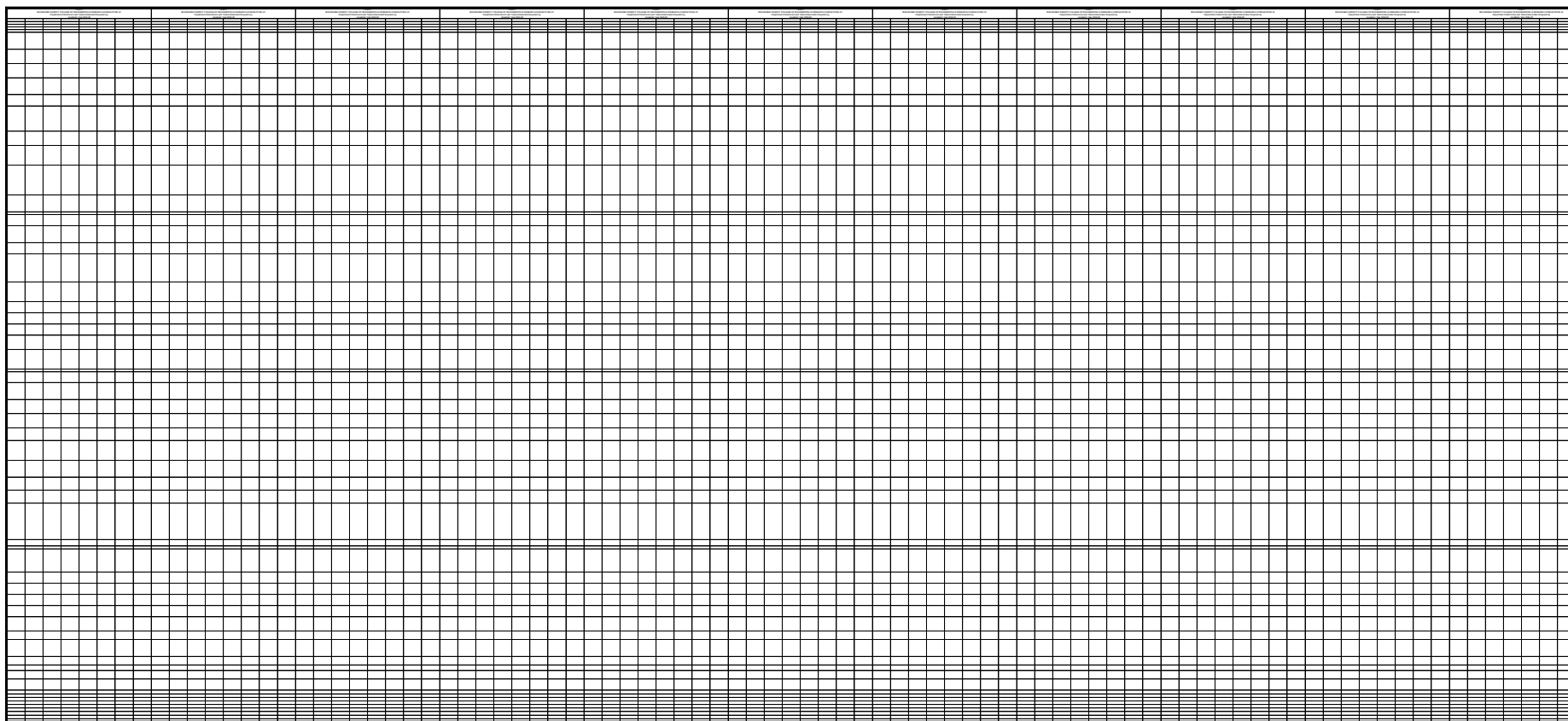


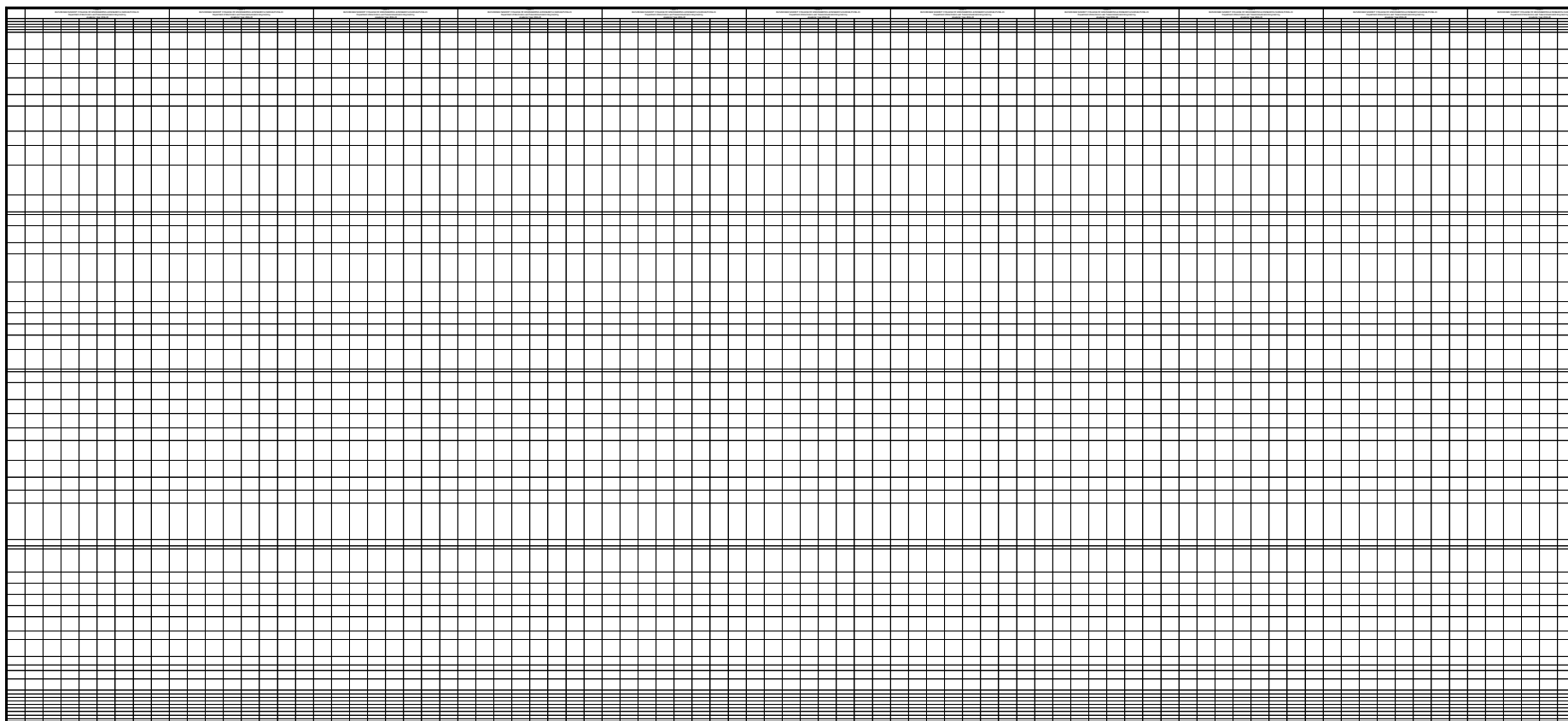


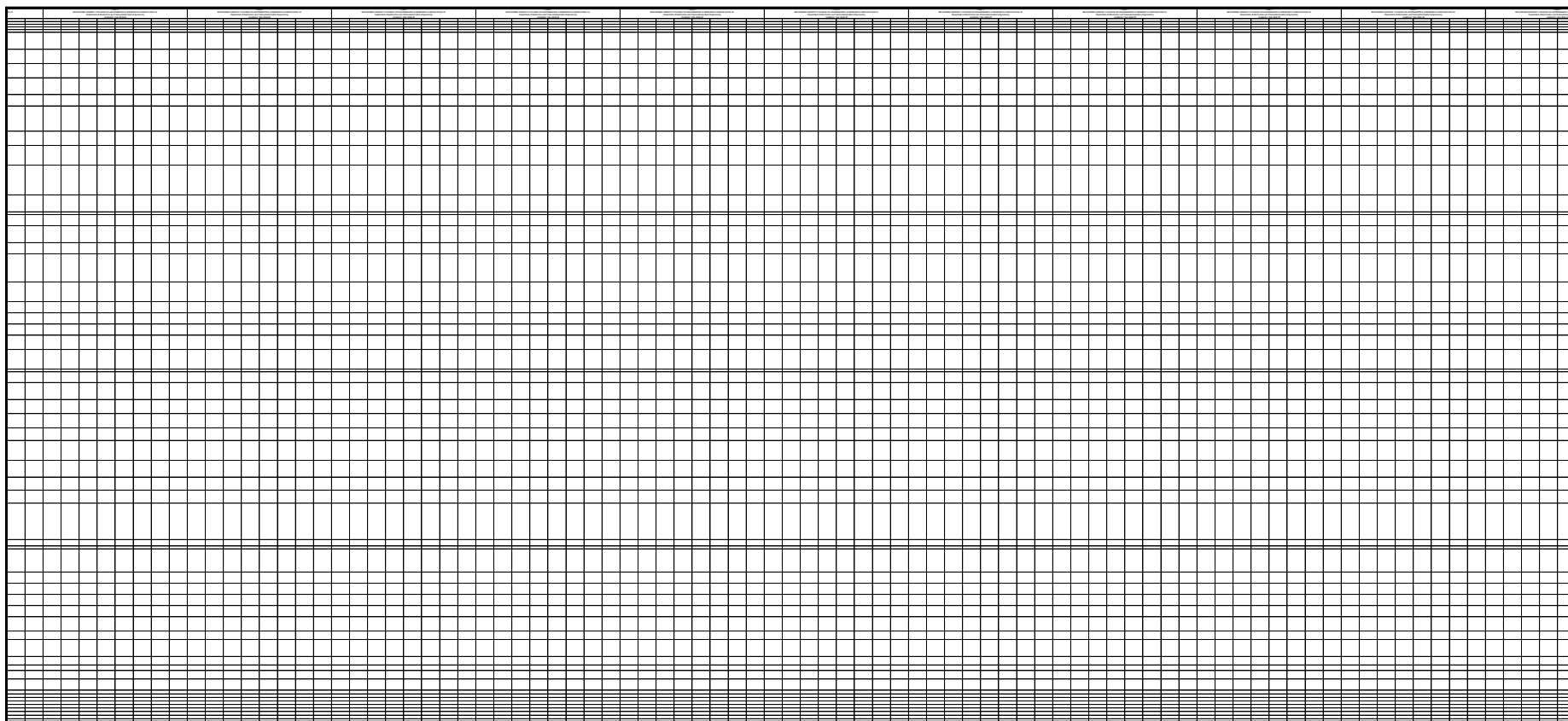


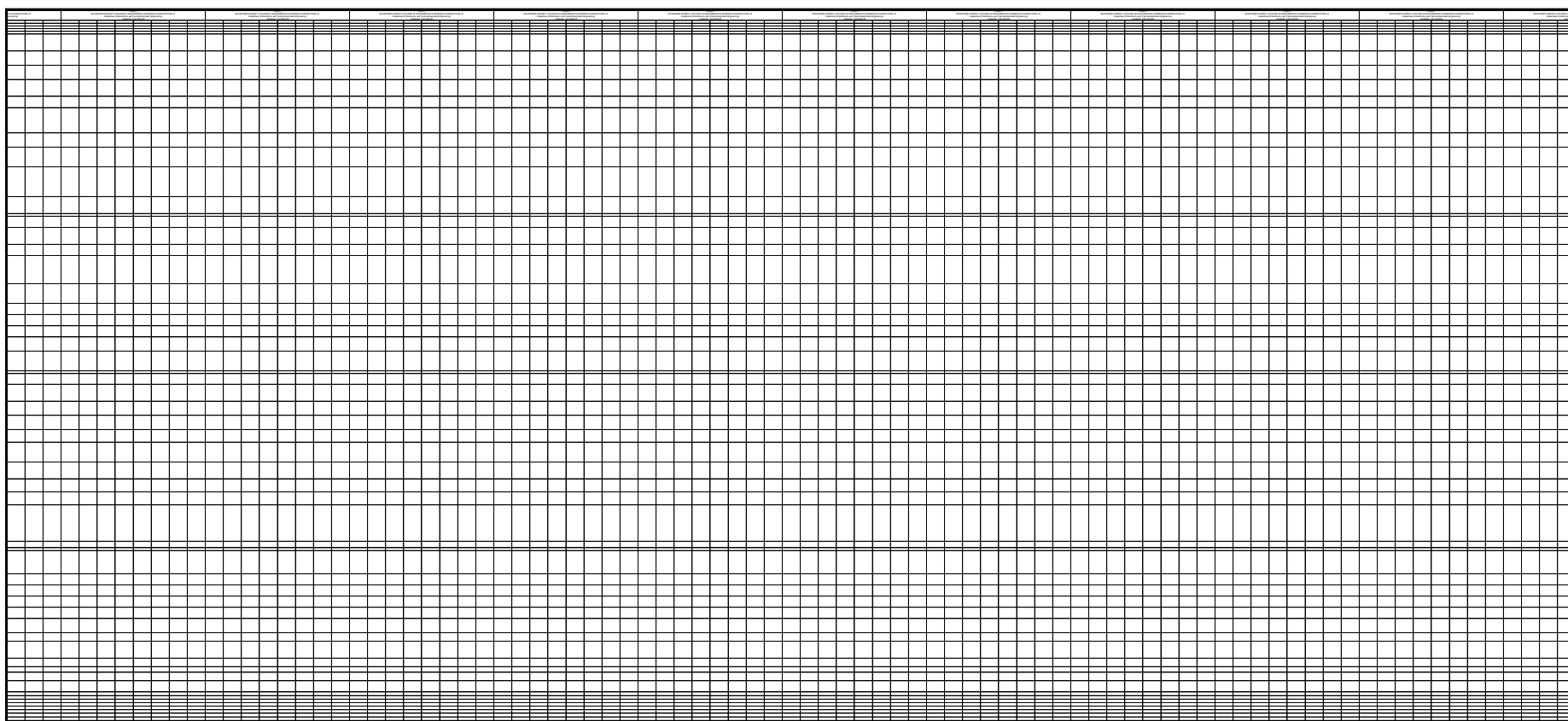


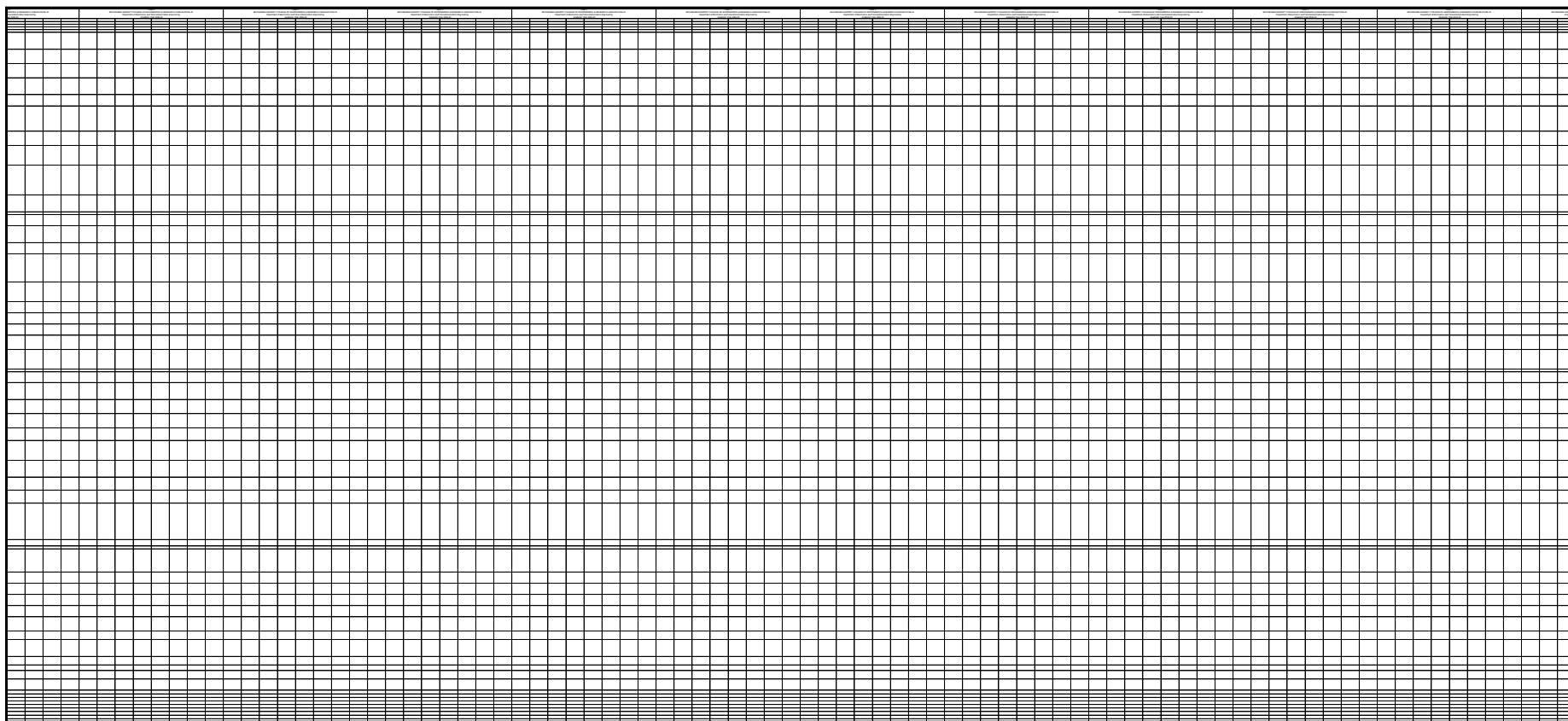


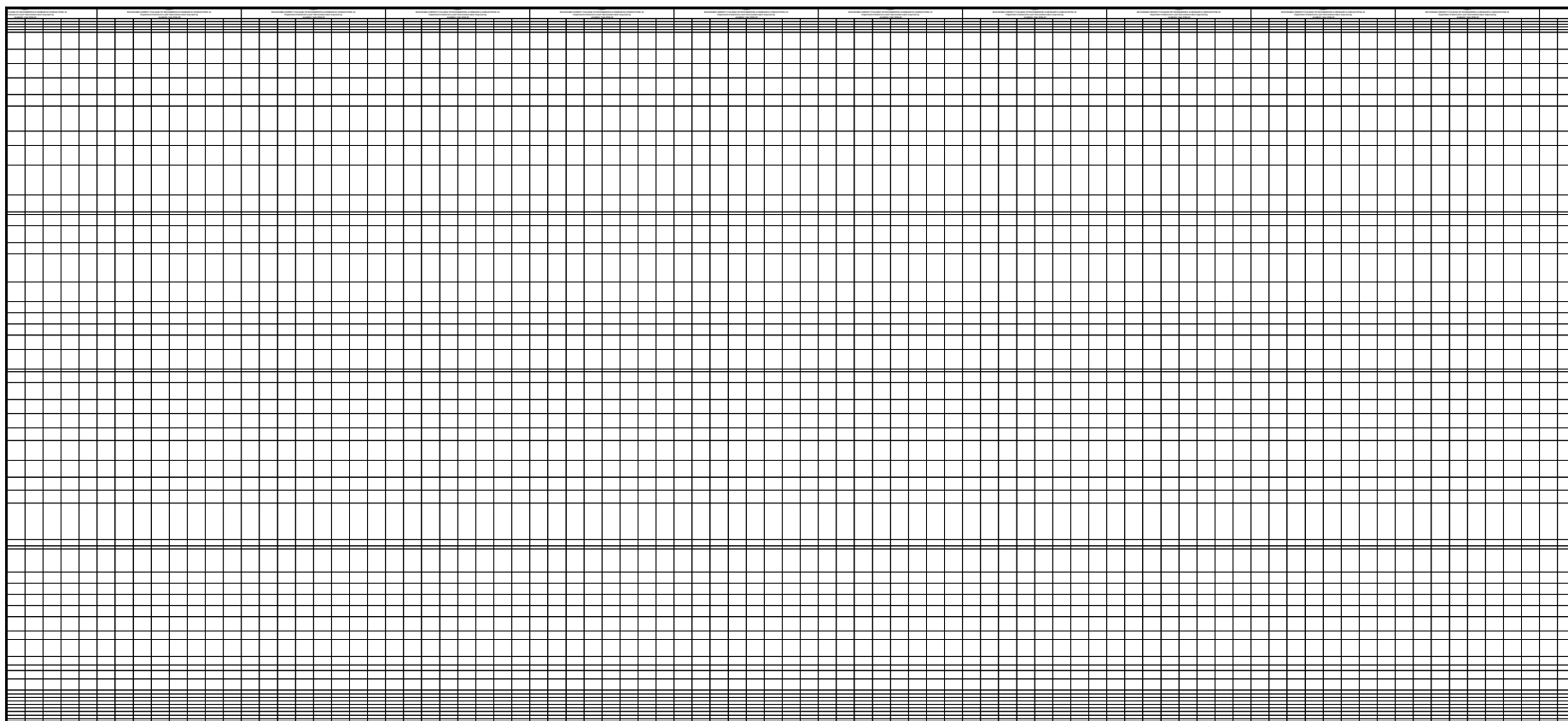


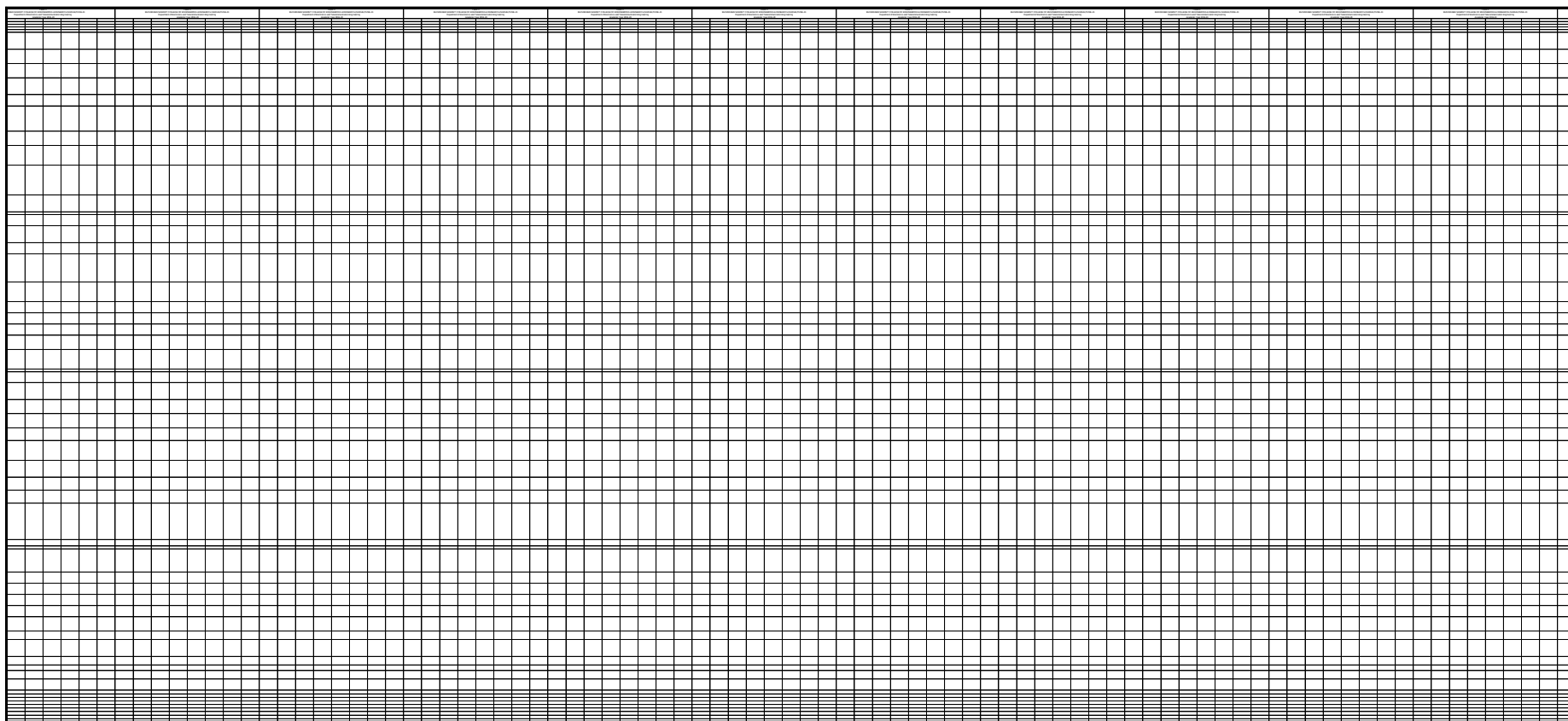


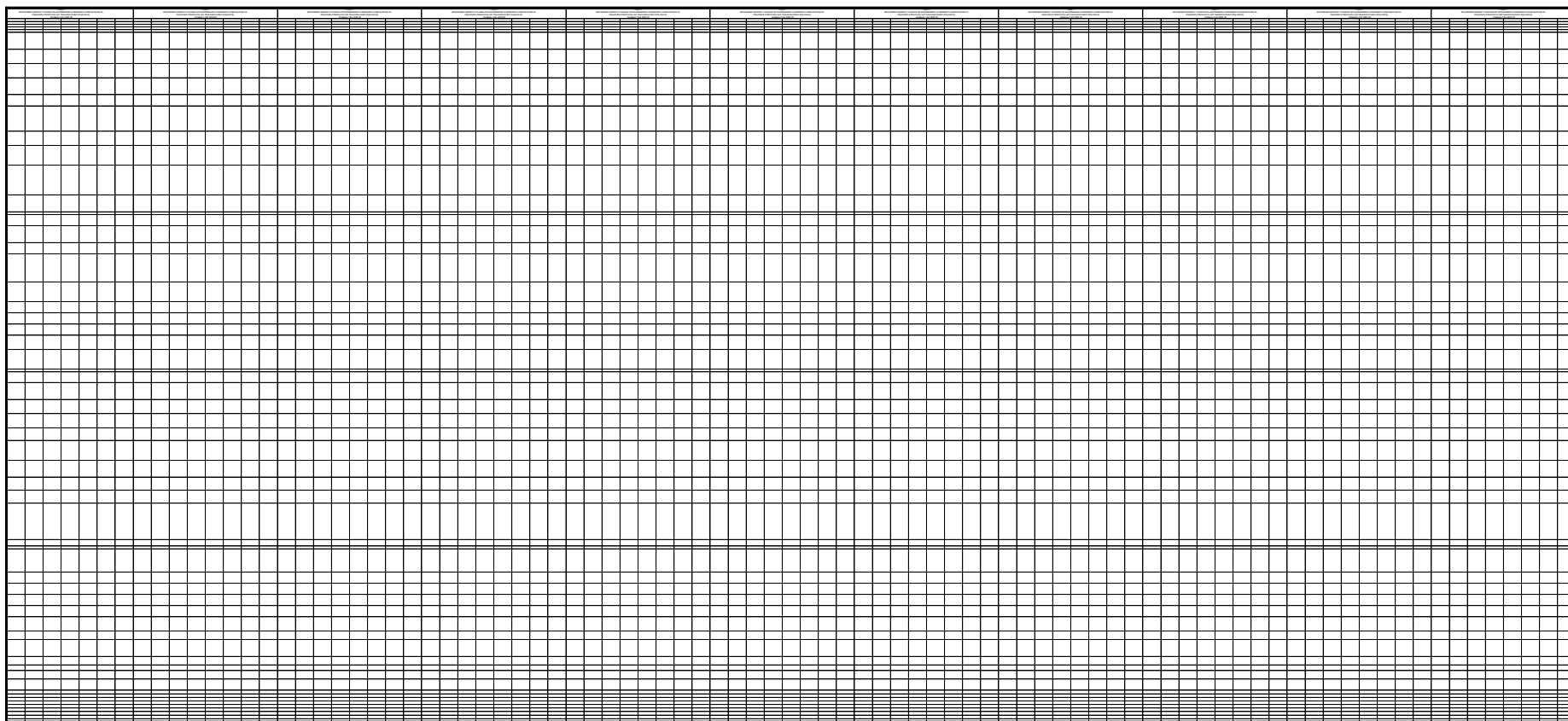


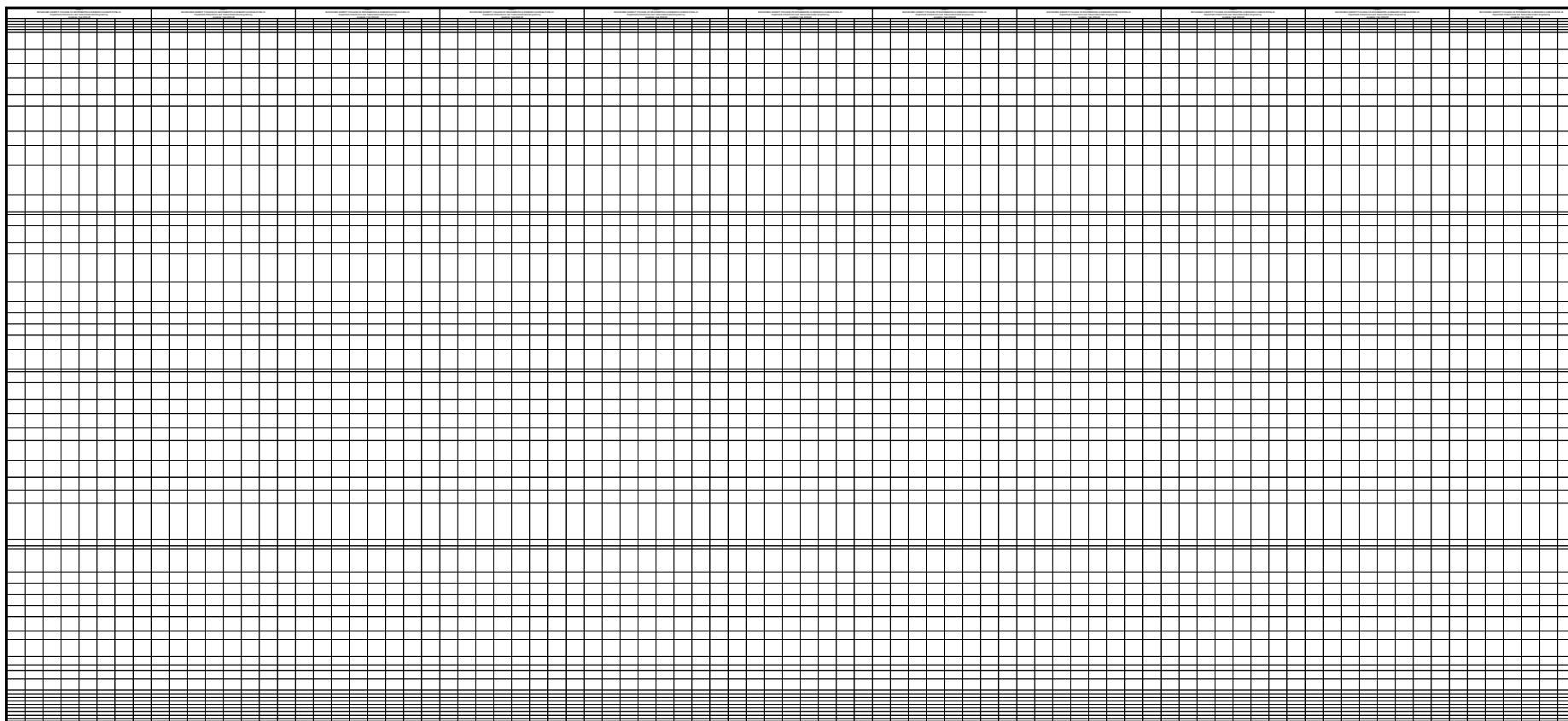


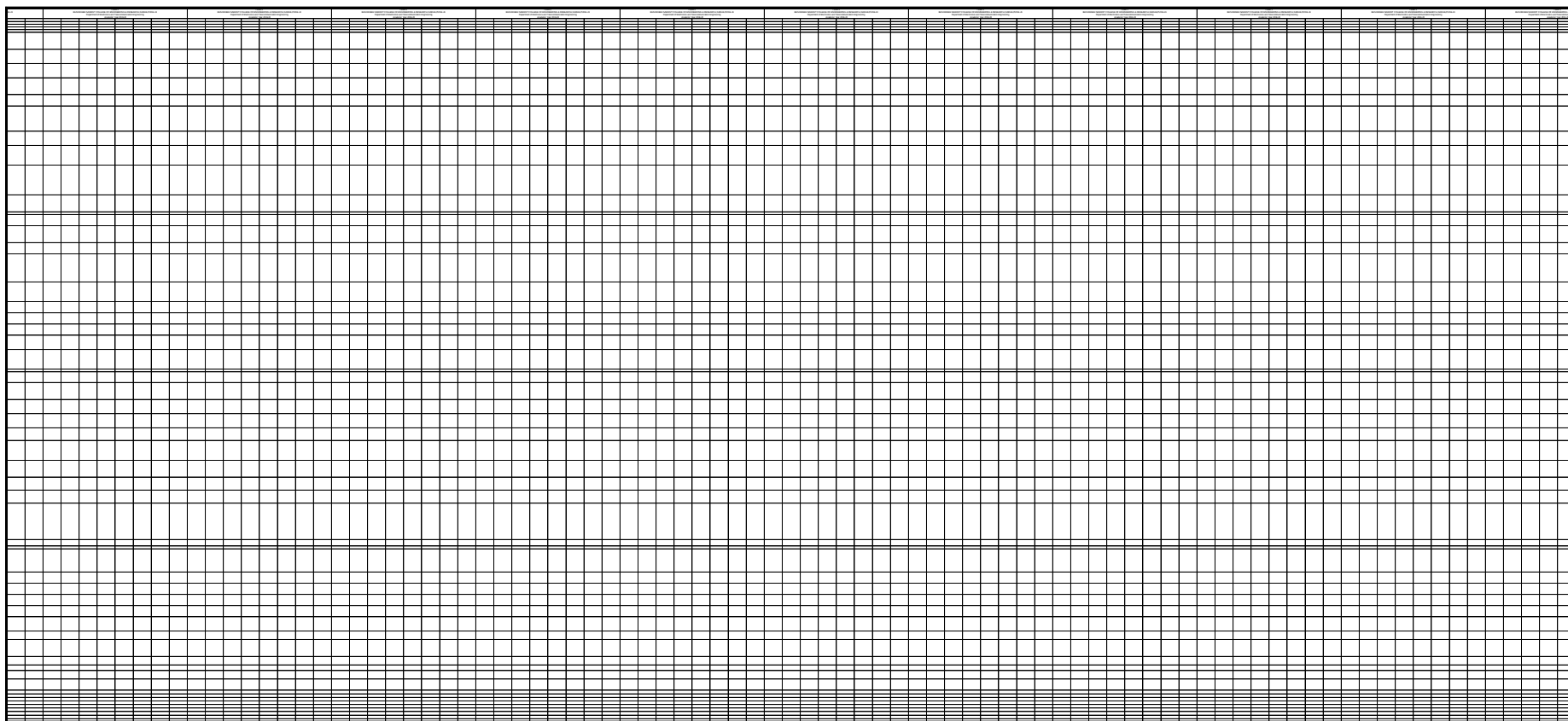


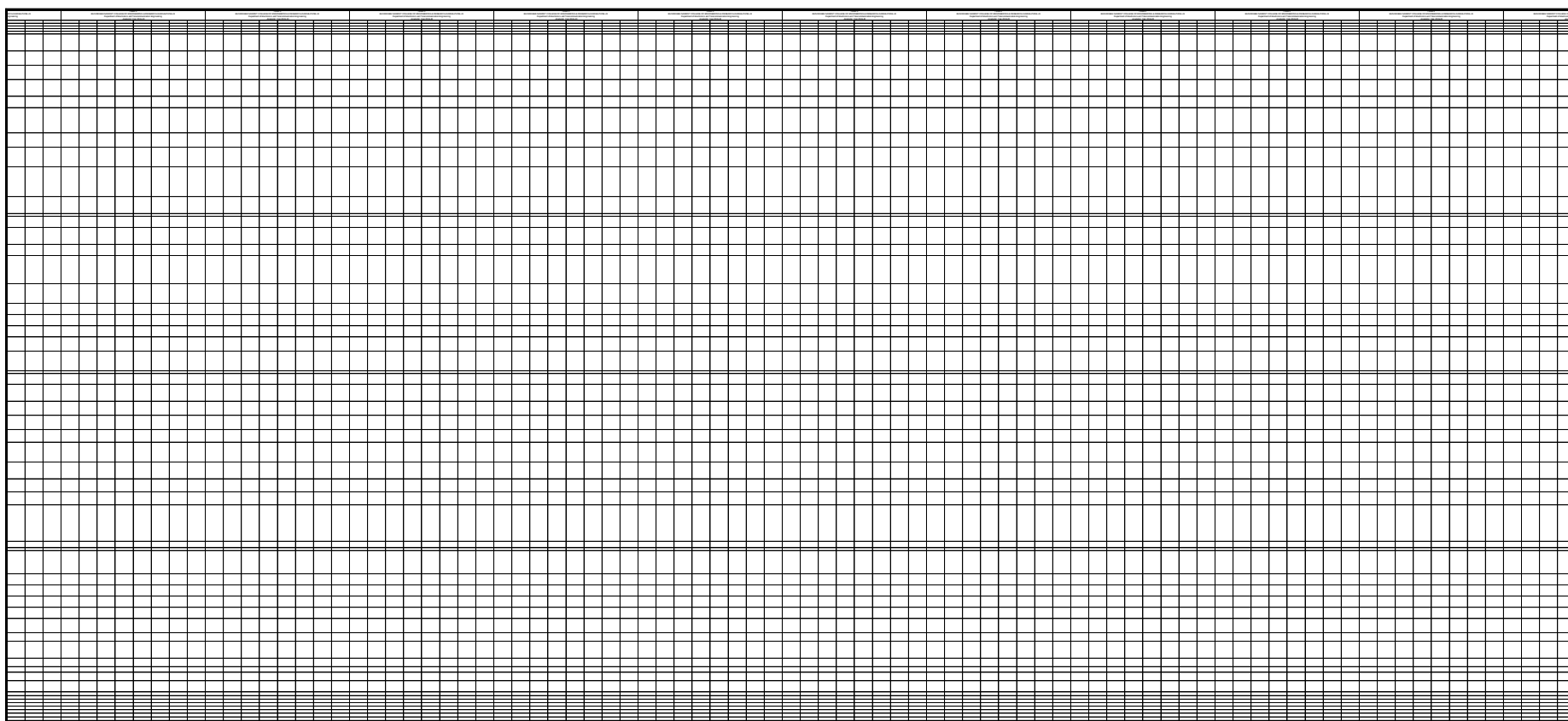




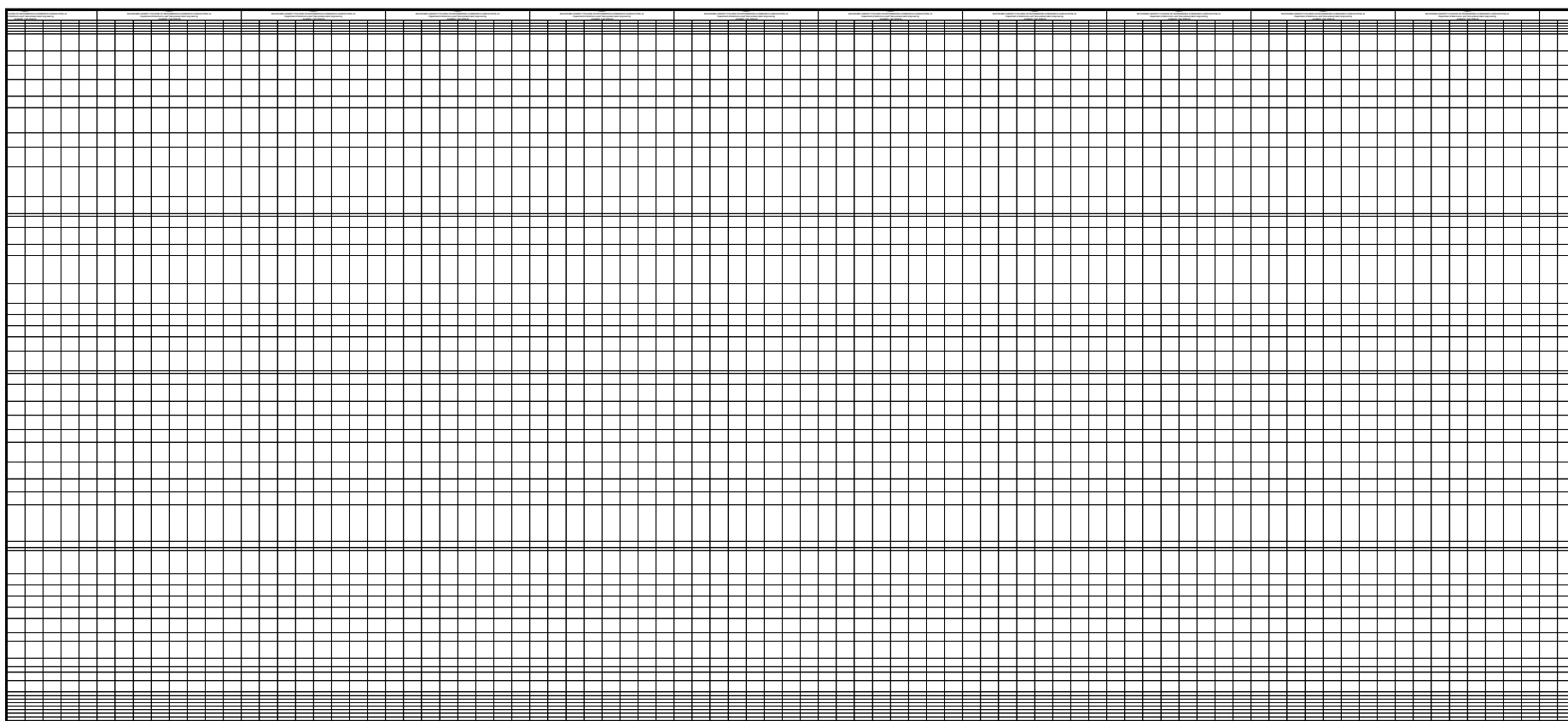


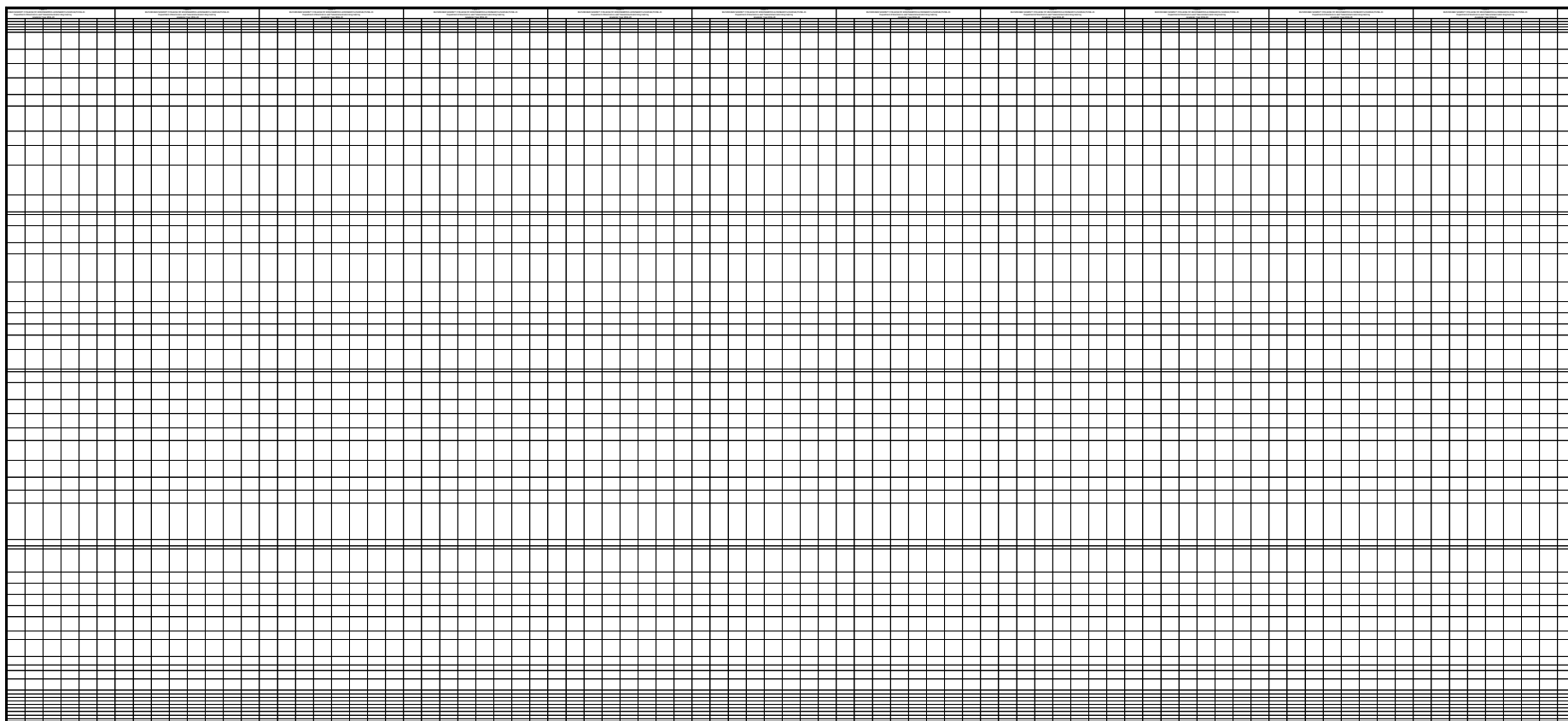


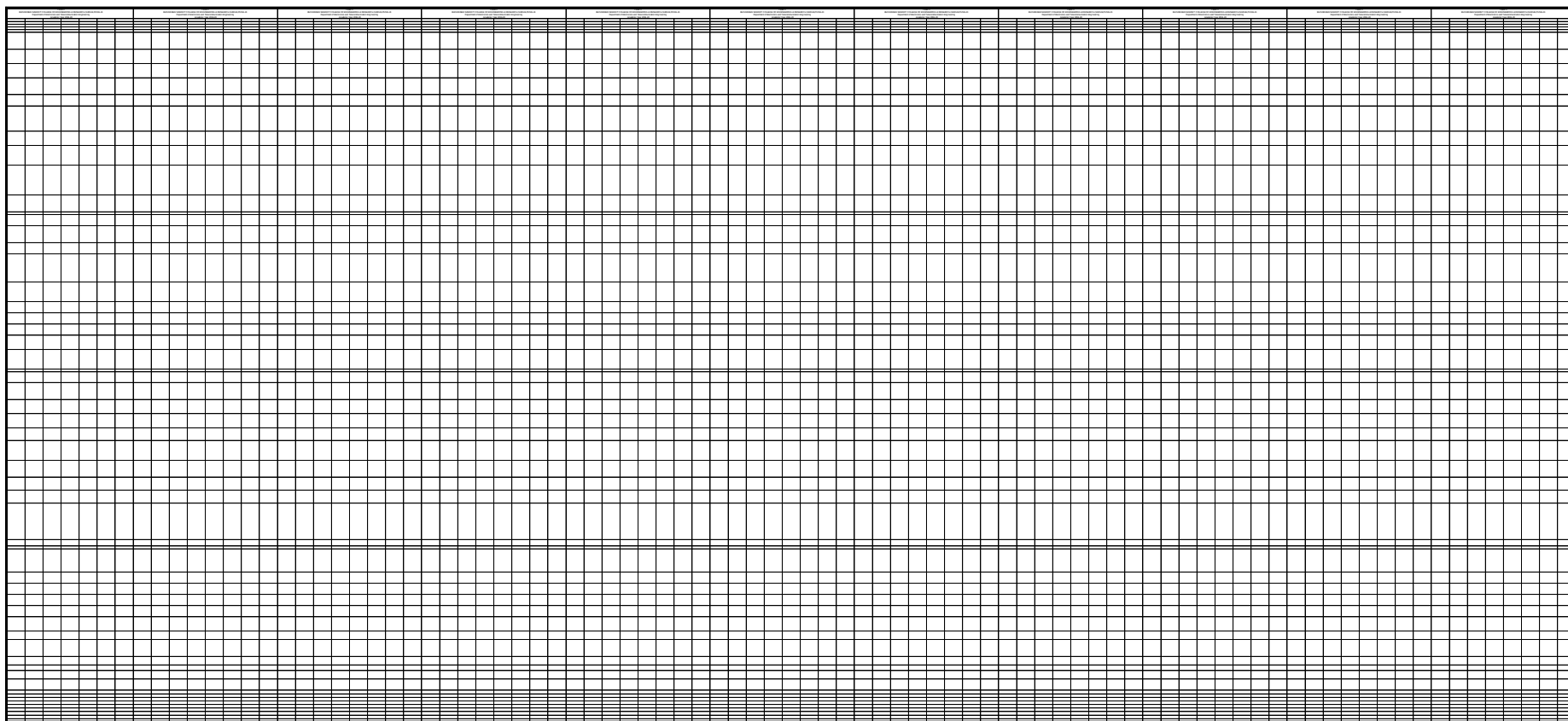


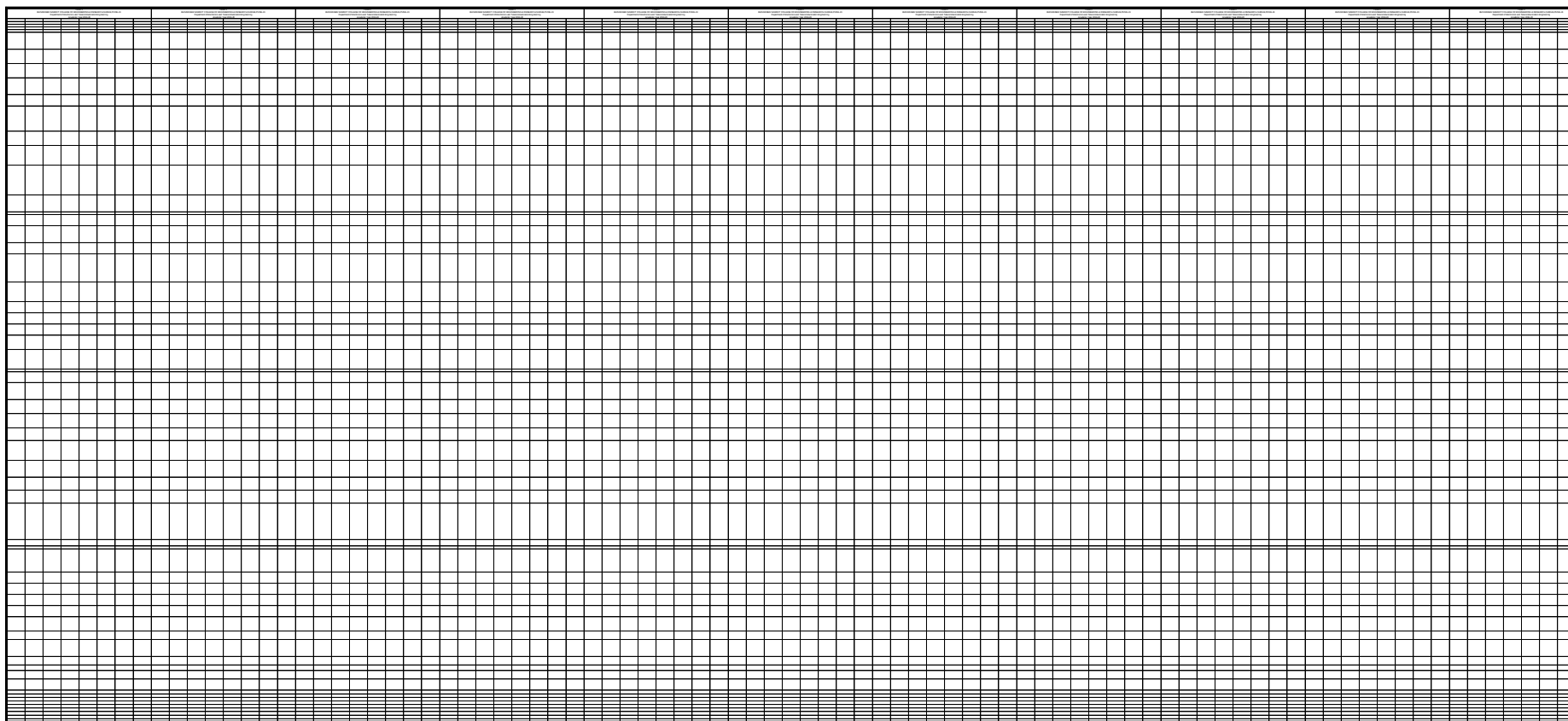


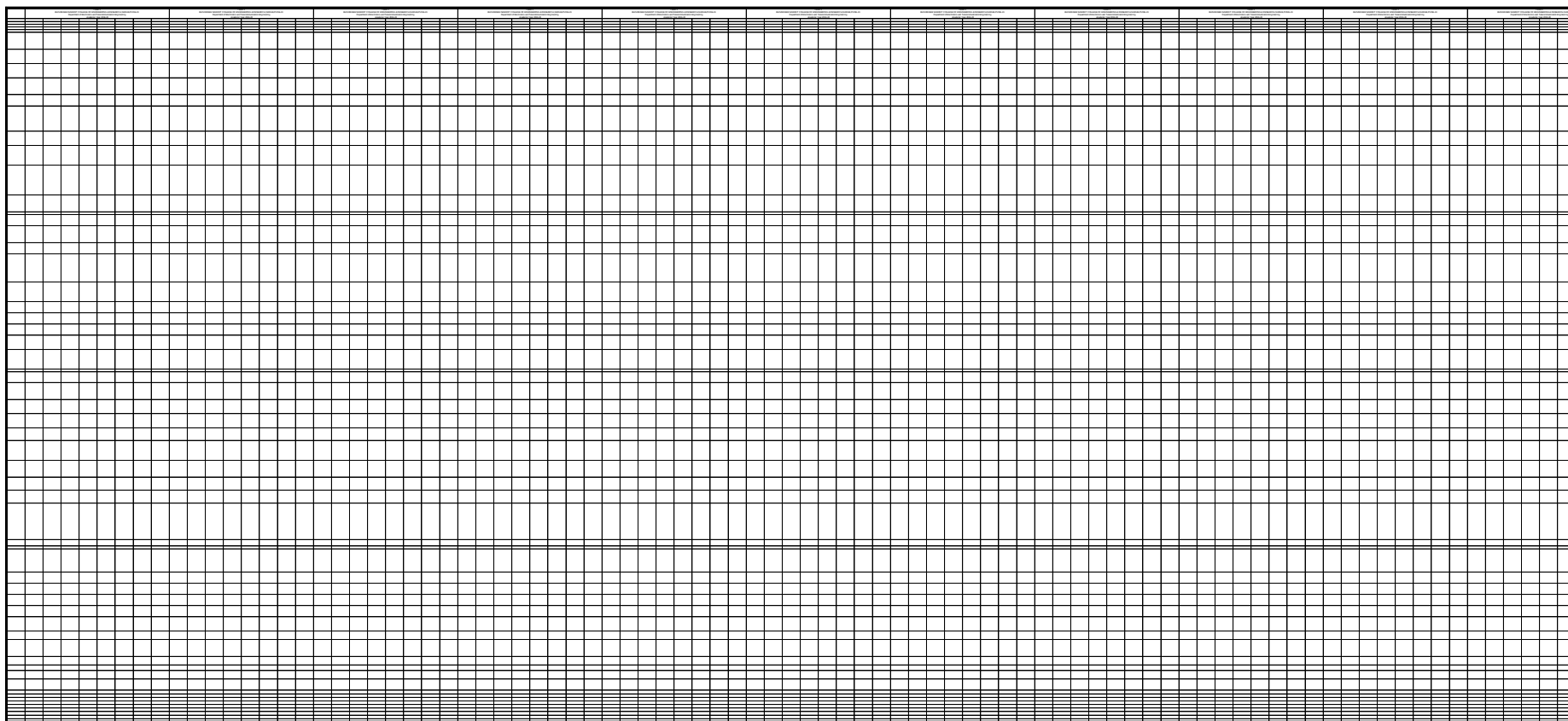
A full-page view of a blank sheet of graph paper. The page is covered by a uniform grid of small squares, typical of standard graph paper used for mathematics or engineering. There are no margins, text, or other markings on the page.

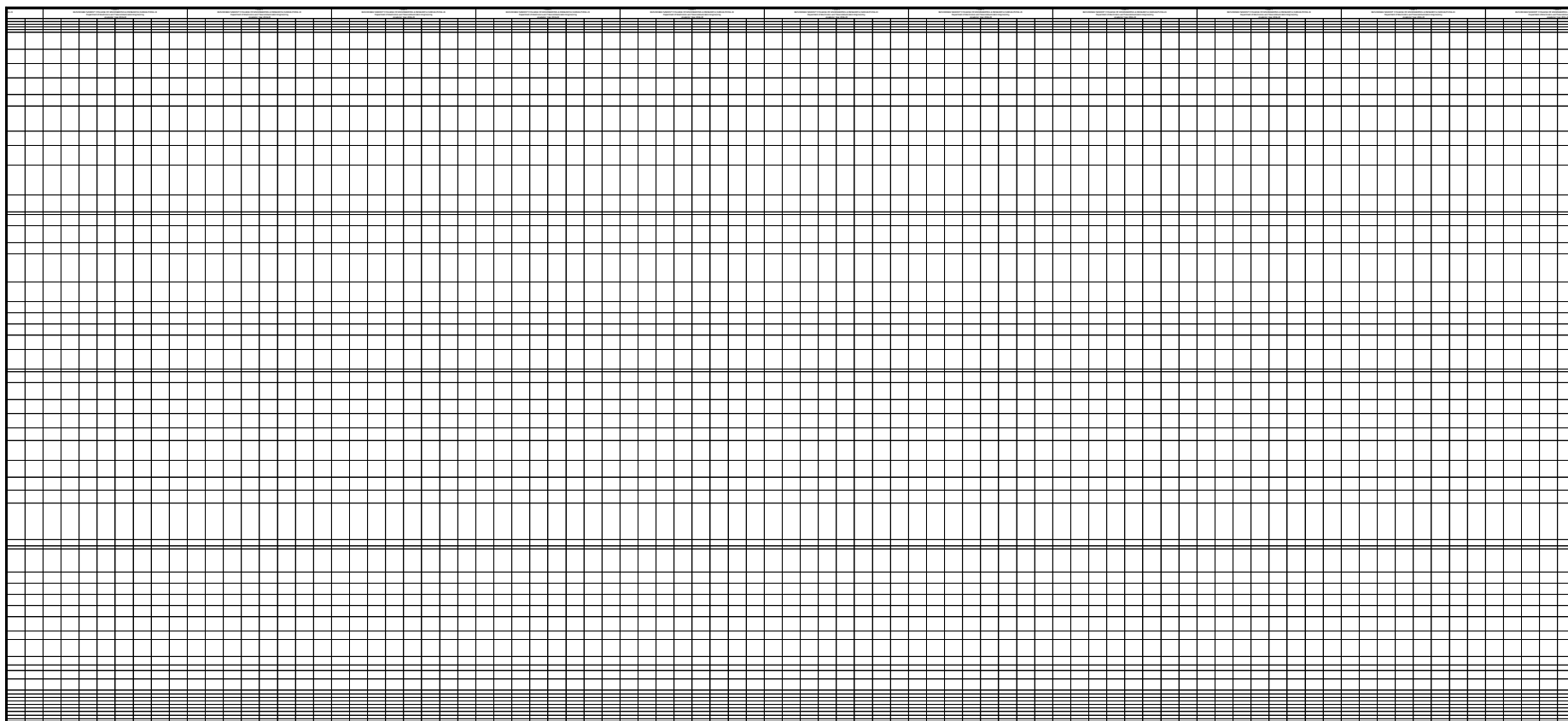


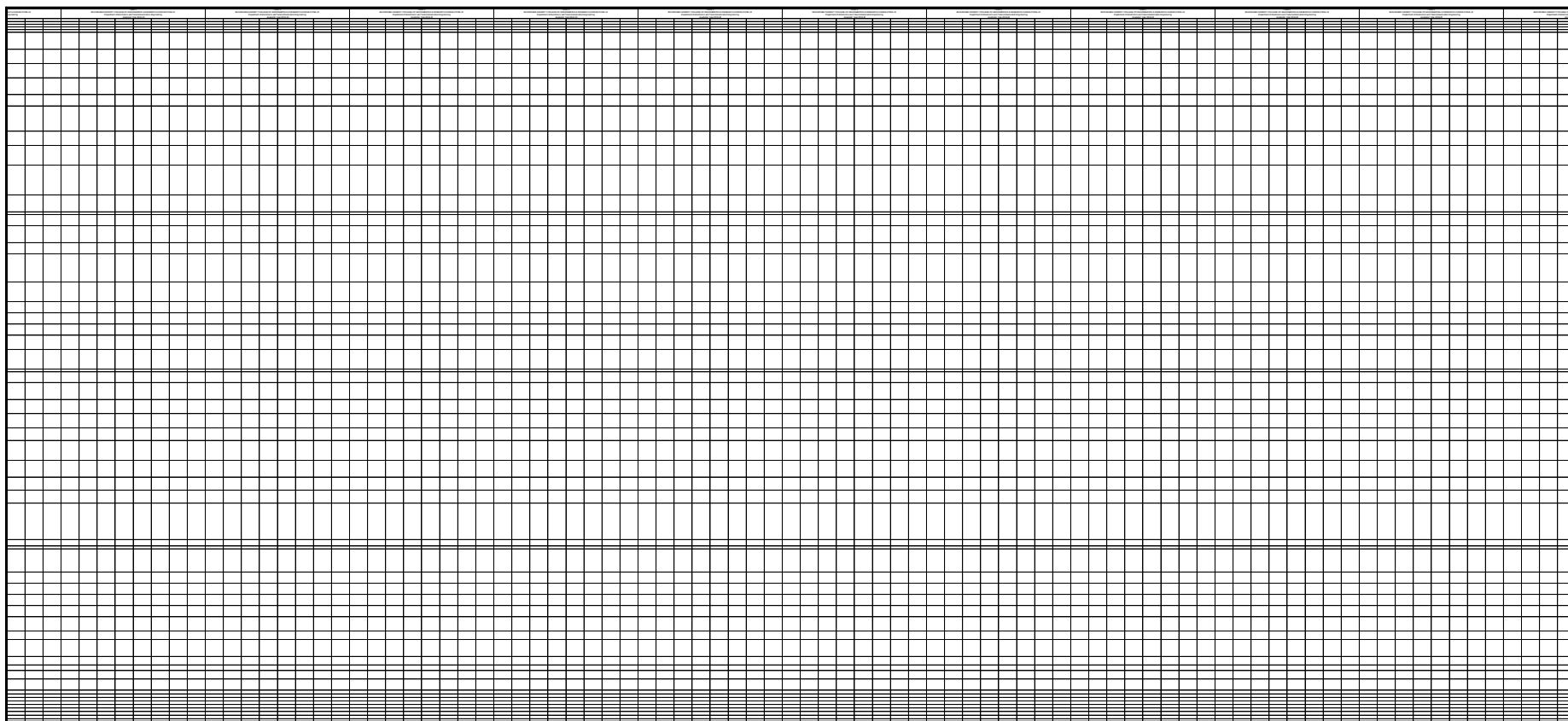


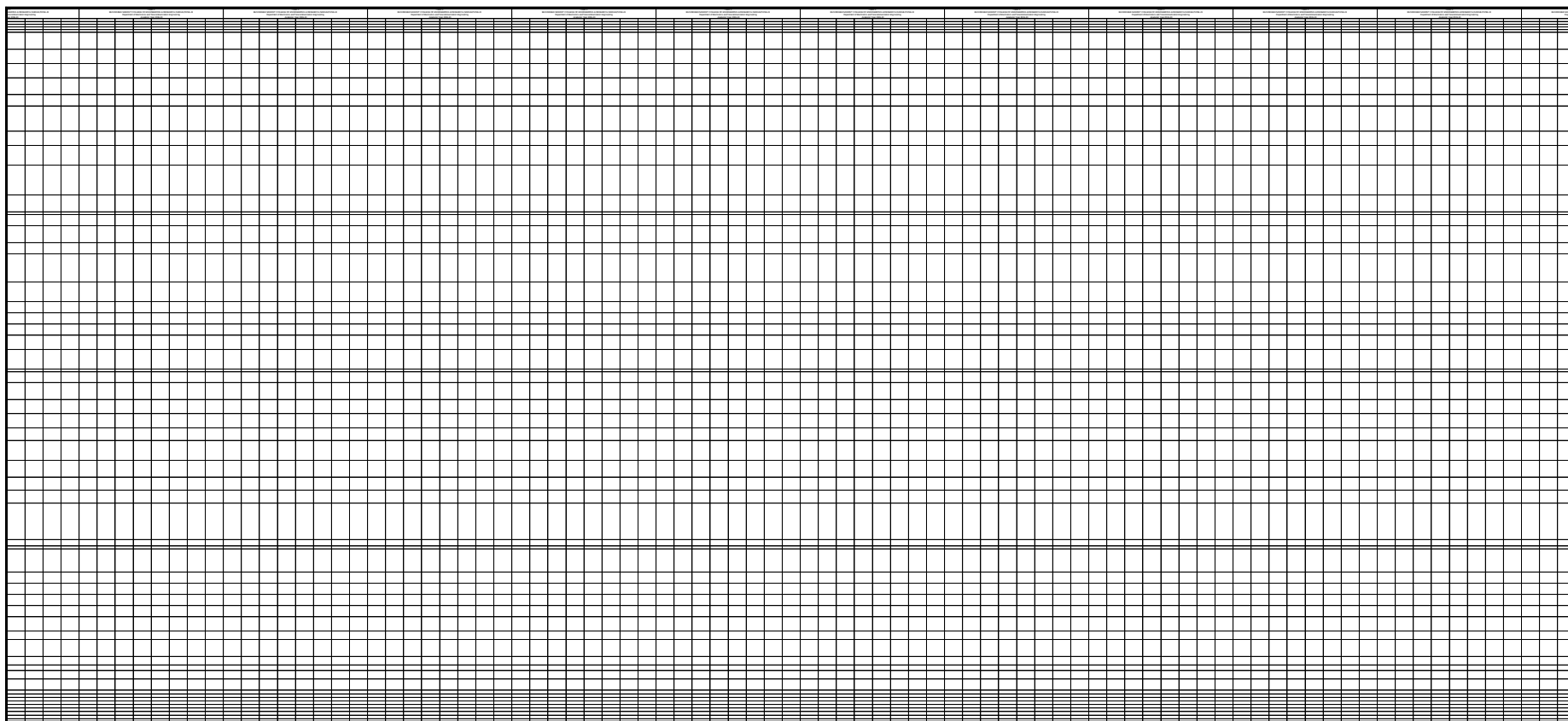


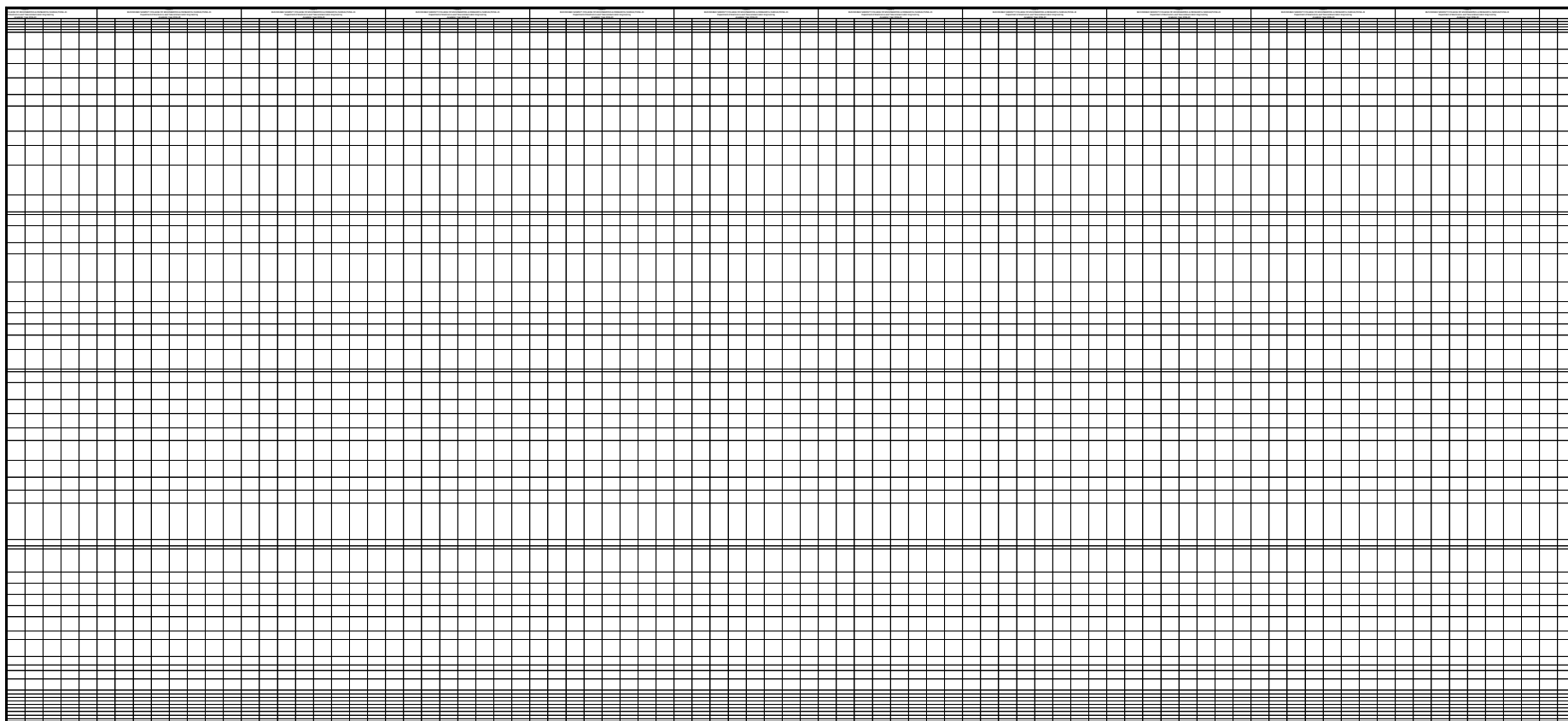


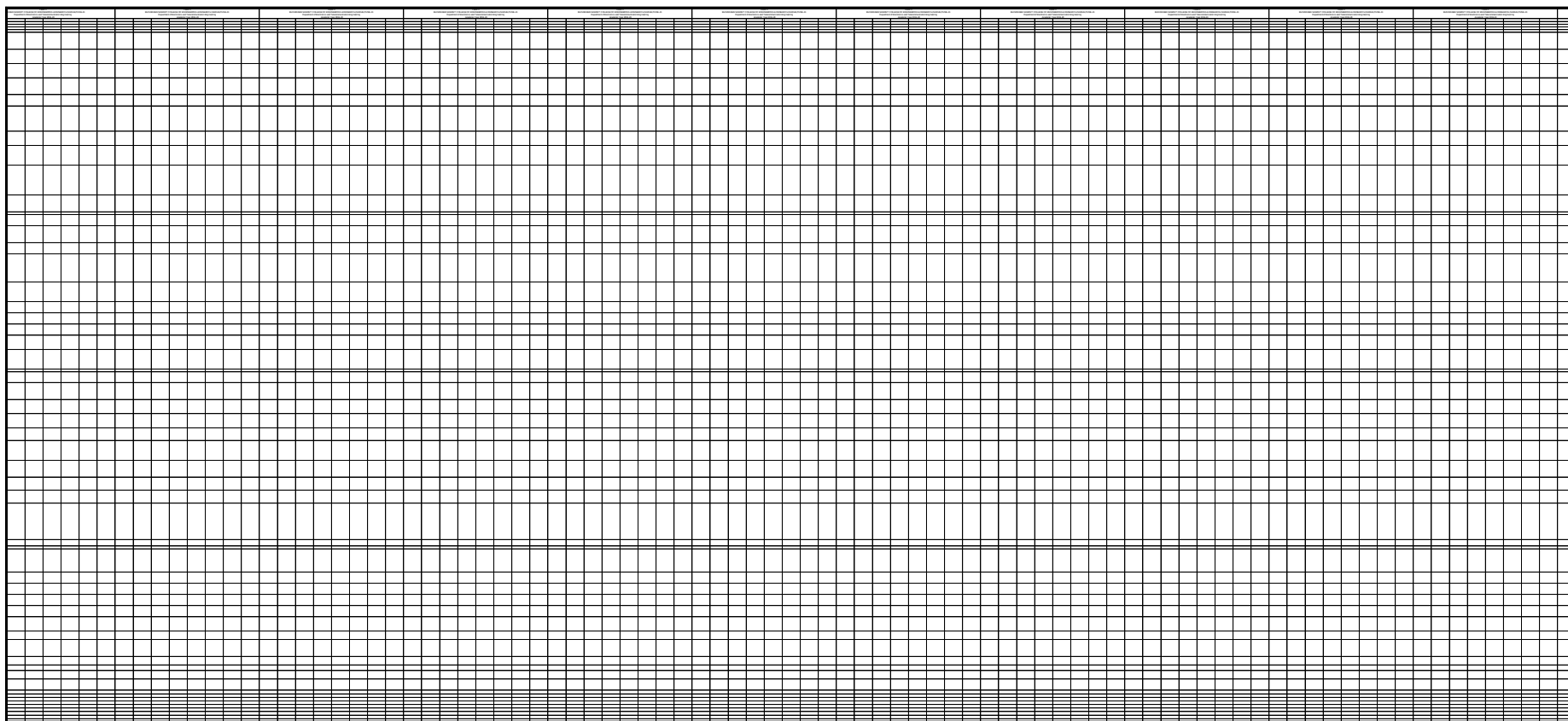


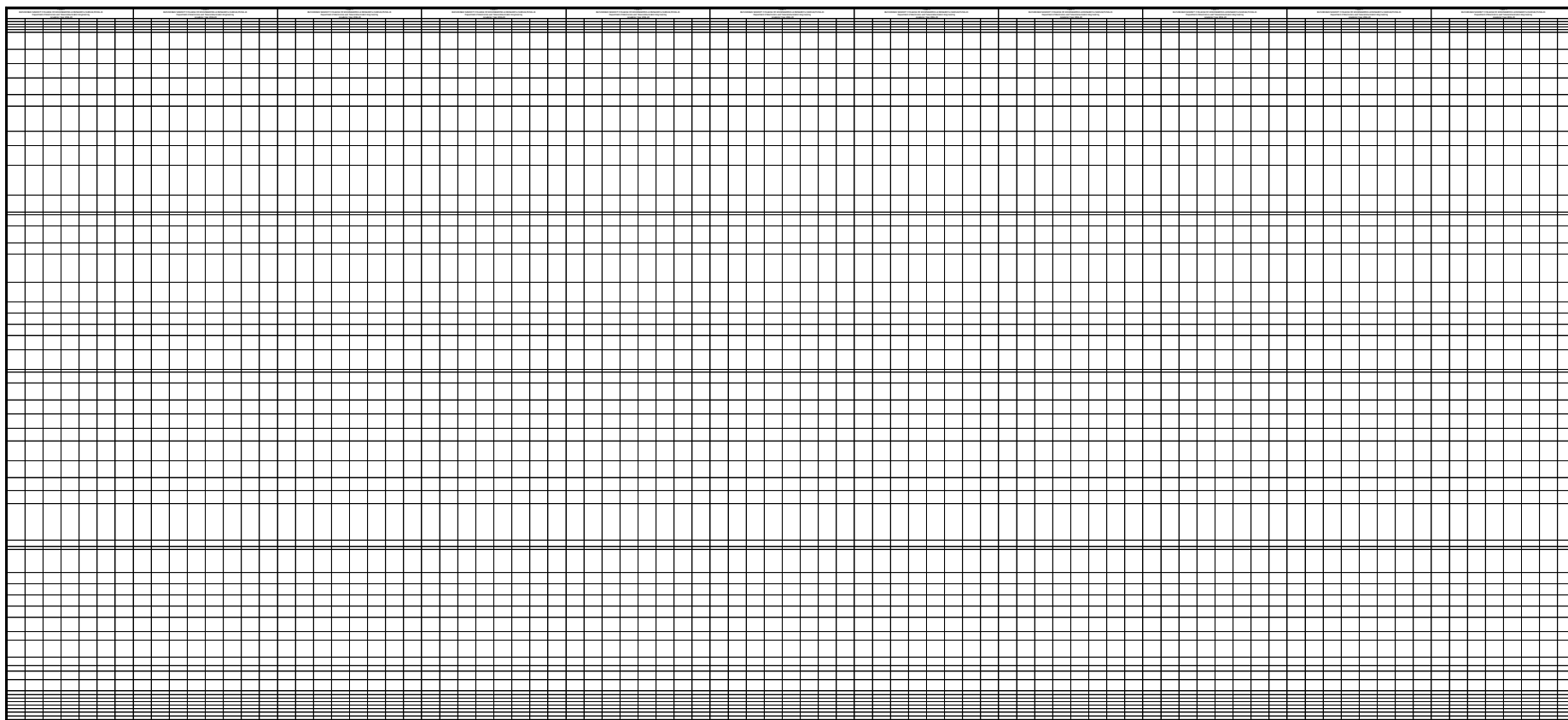


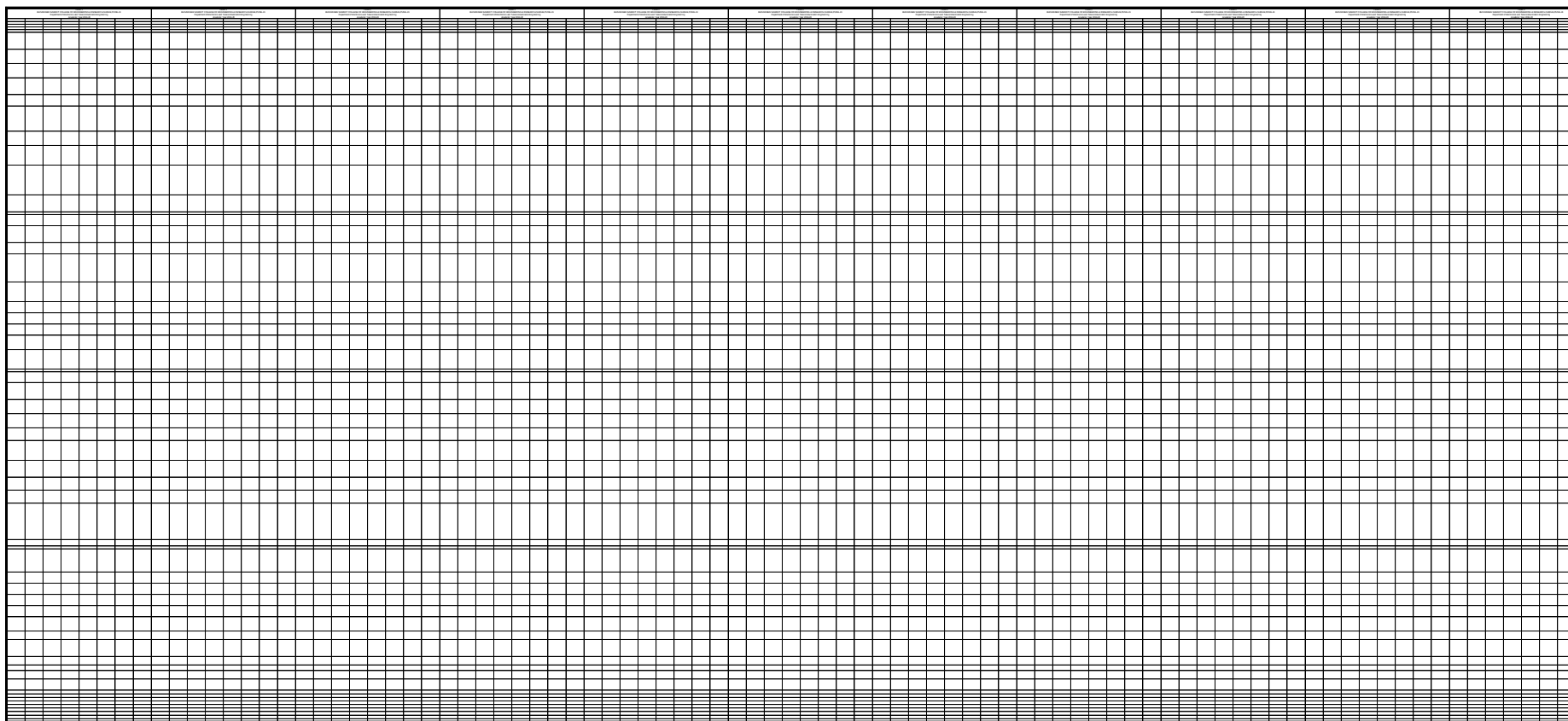


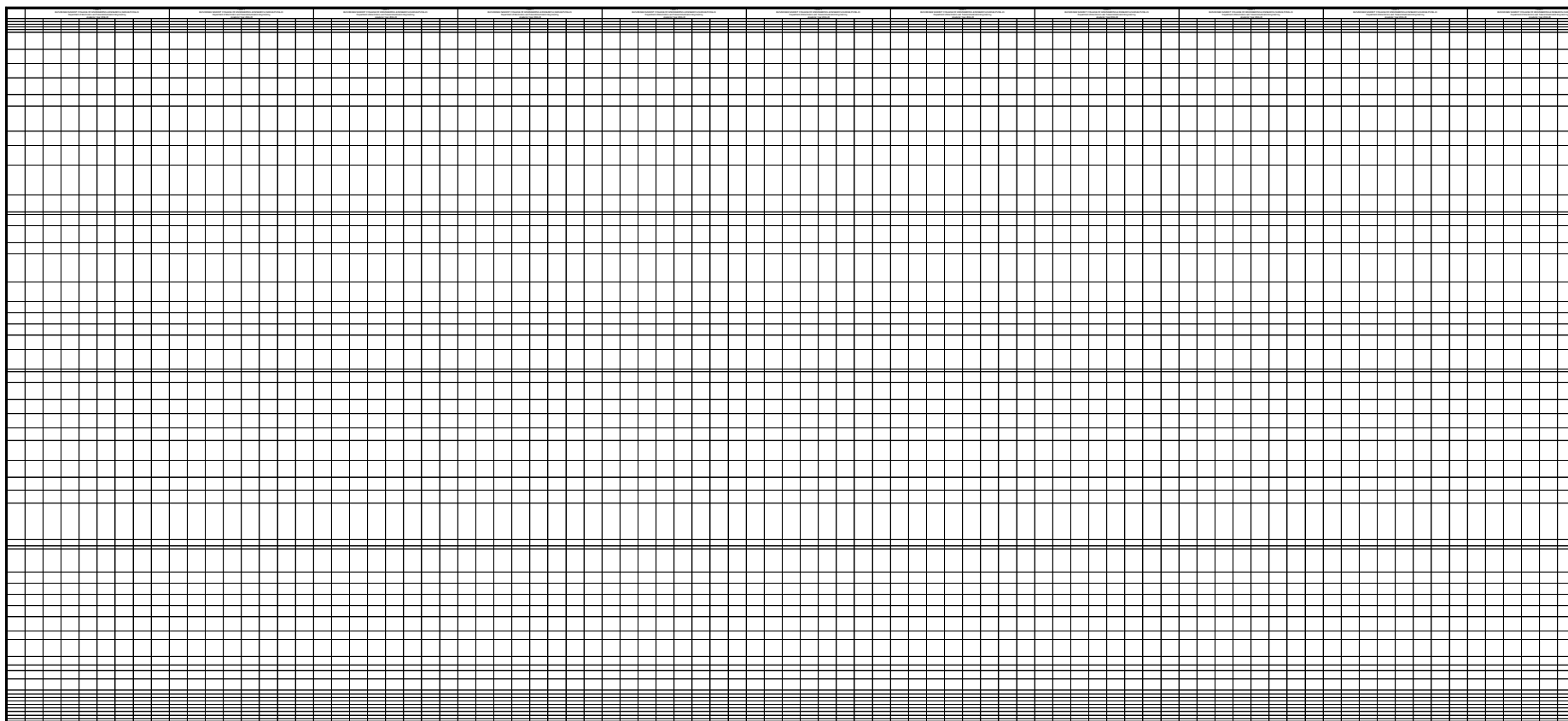


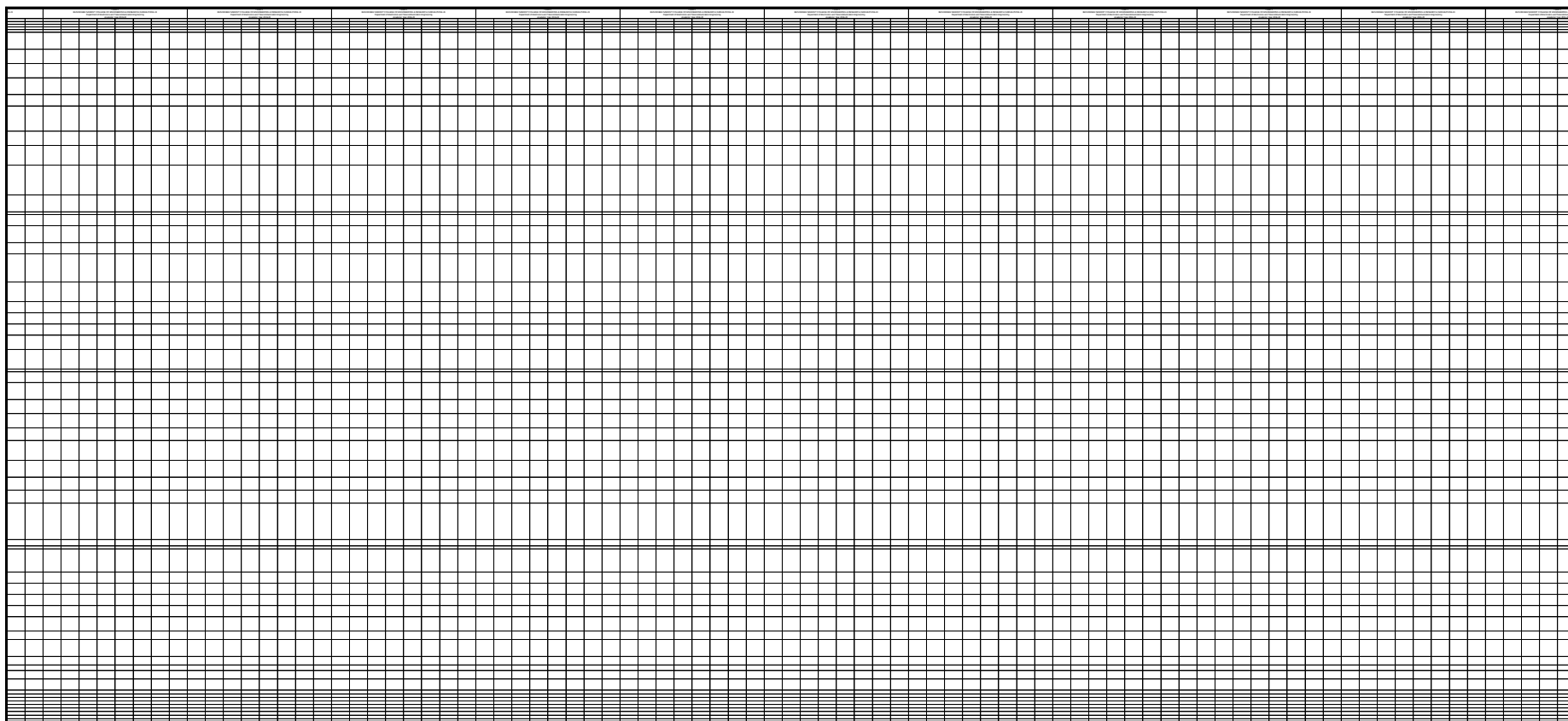


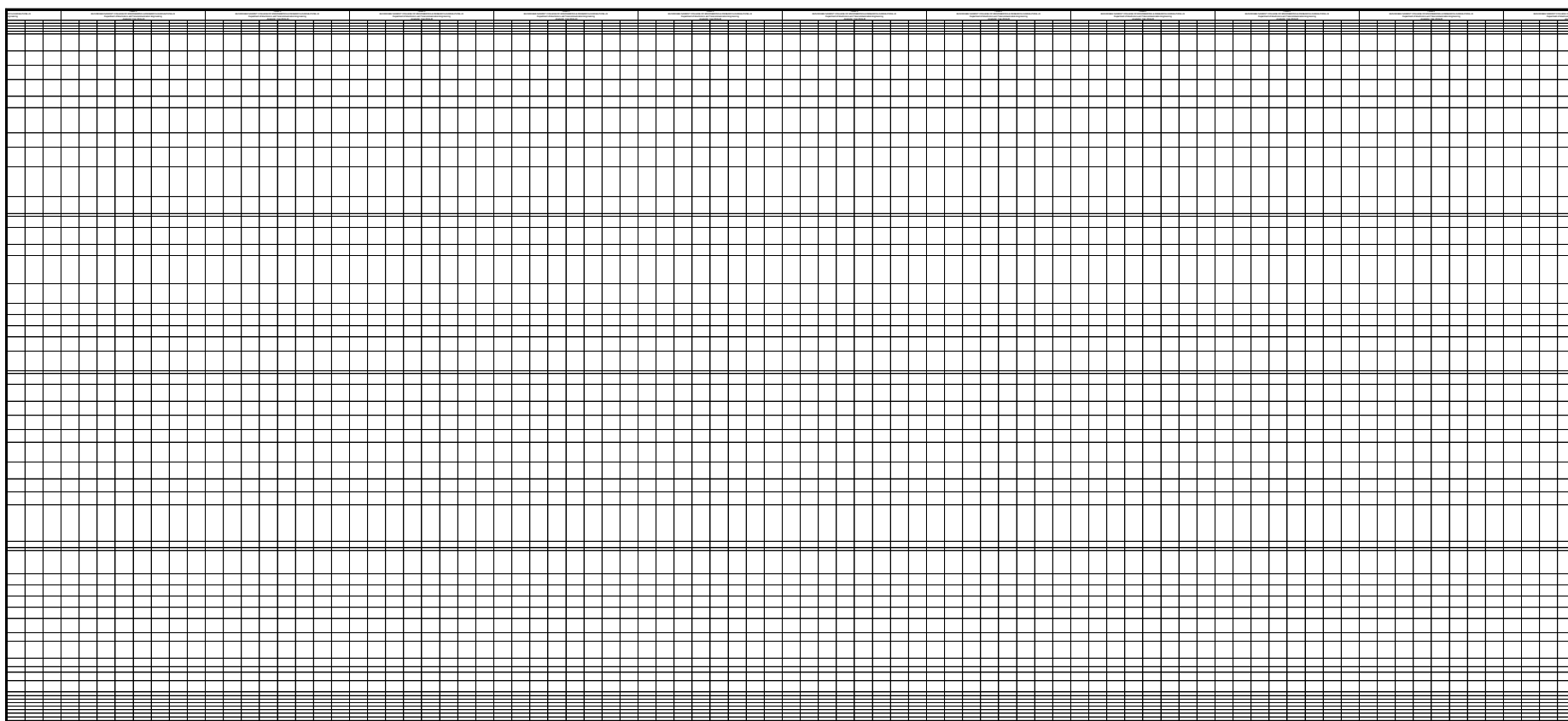




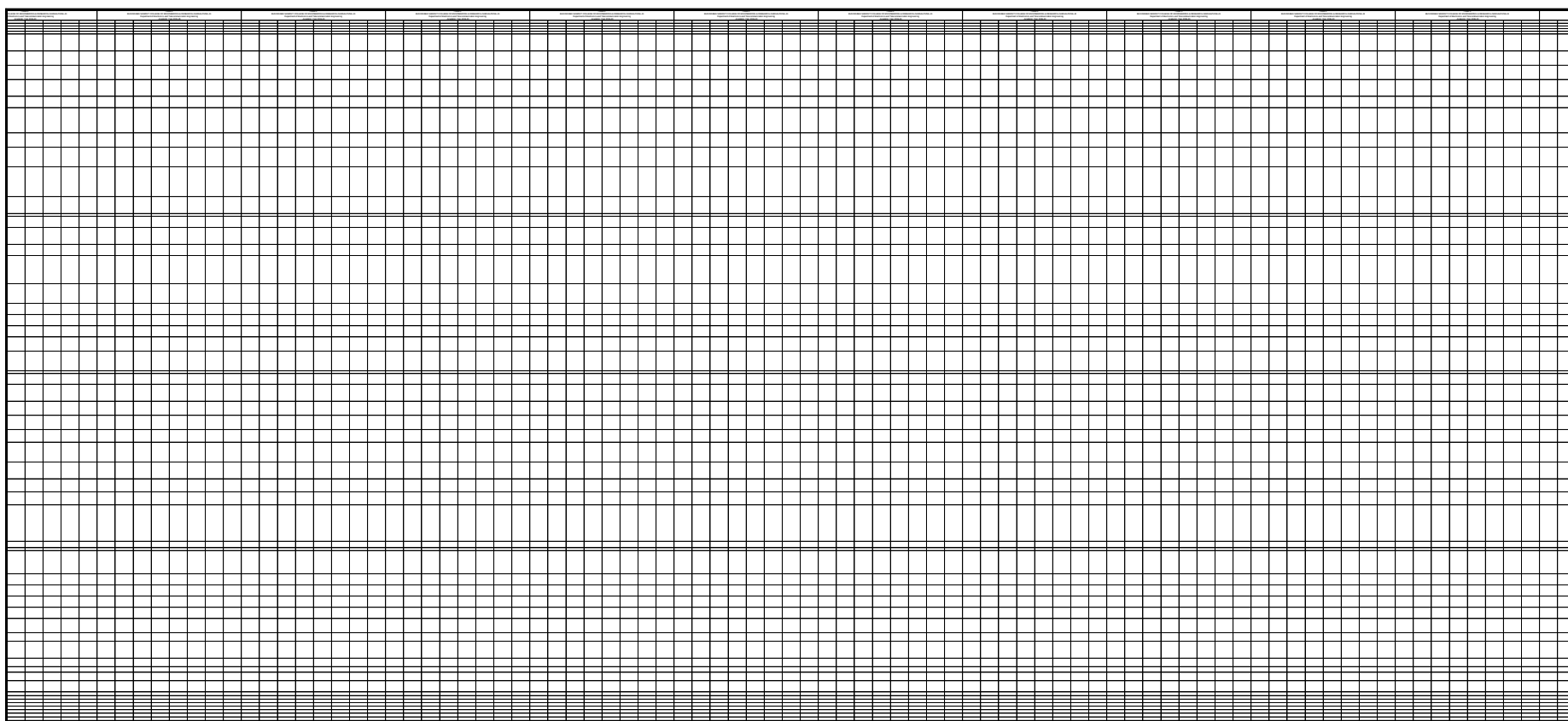


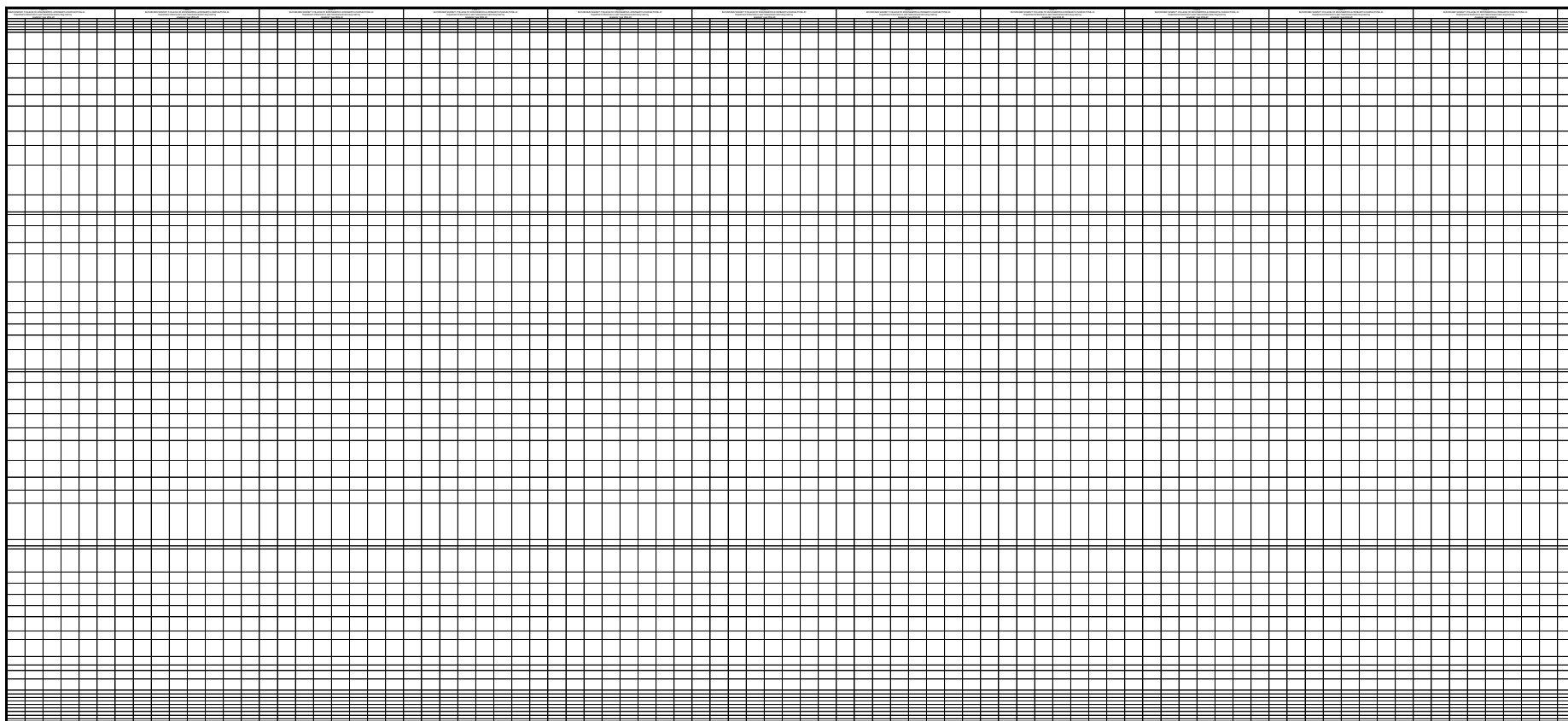


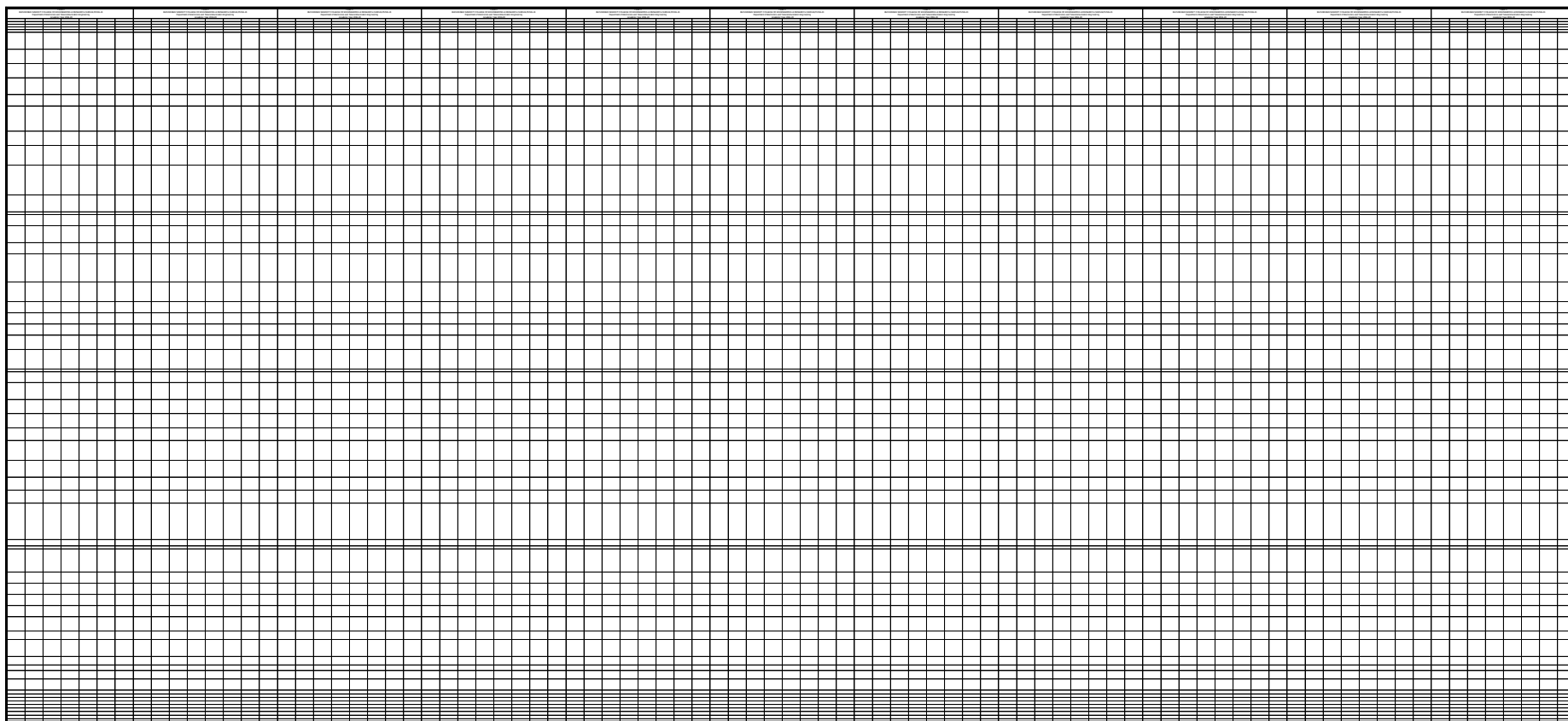


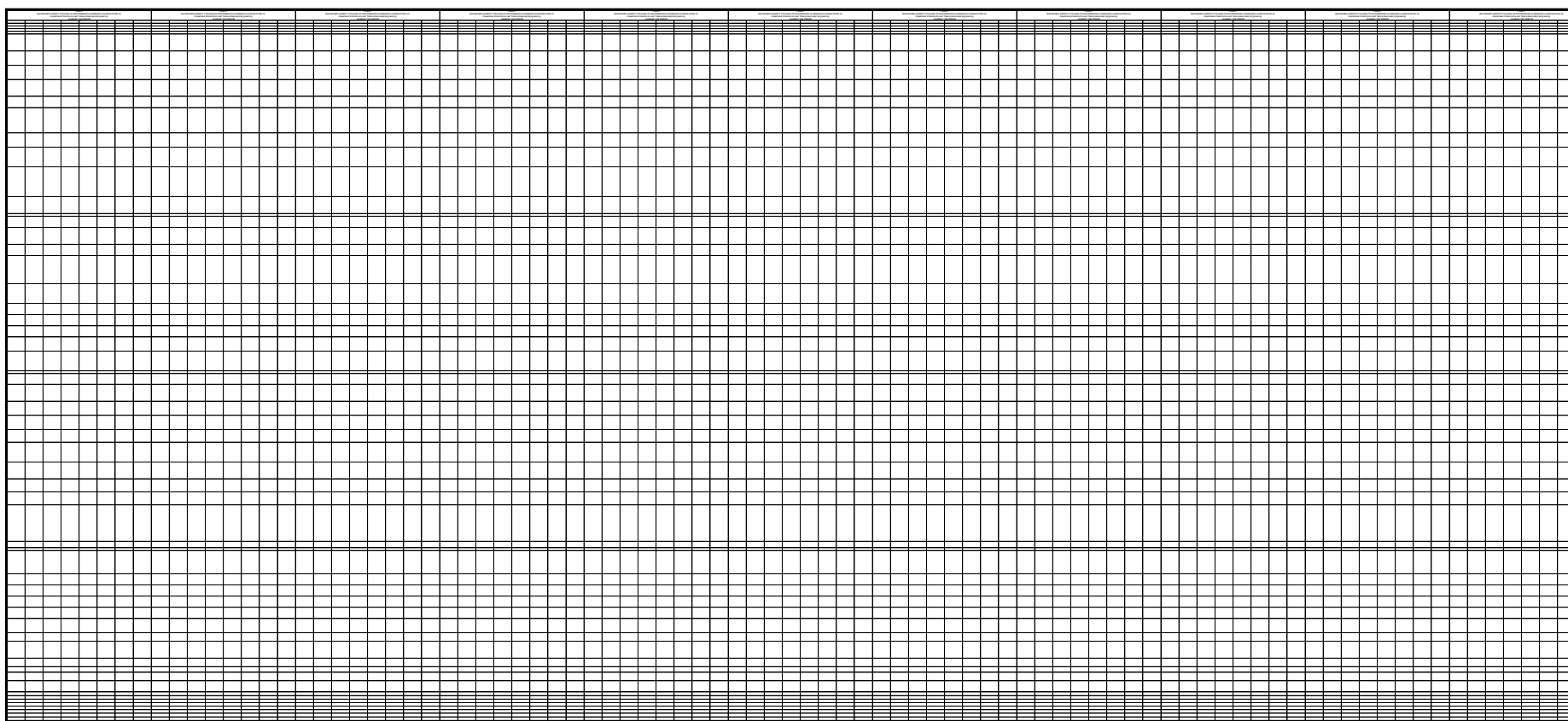


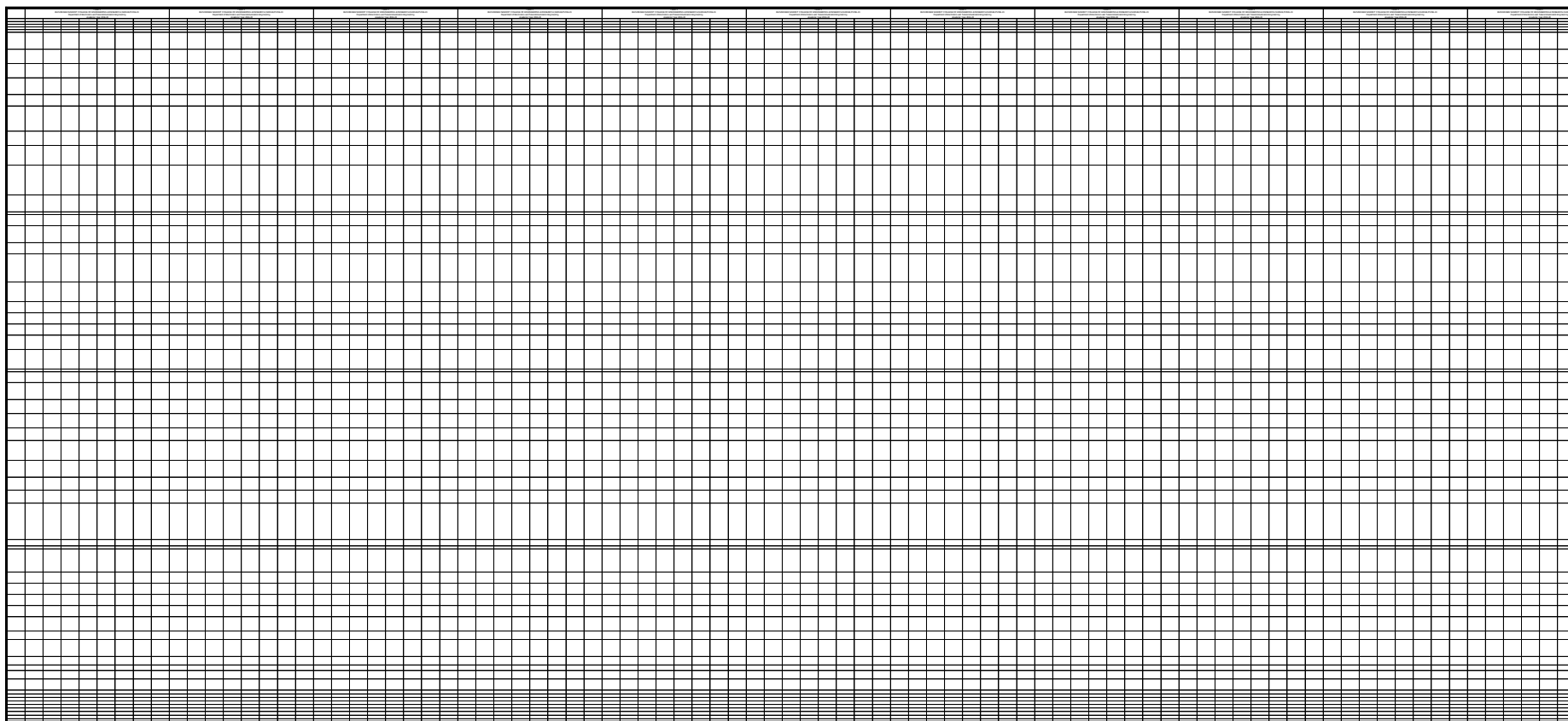
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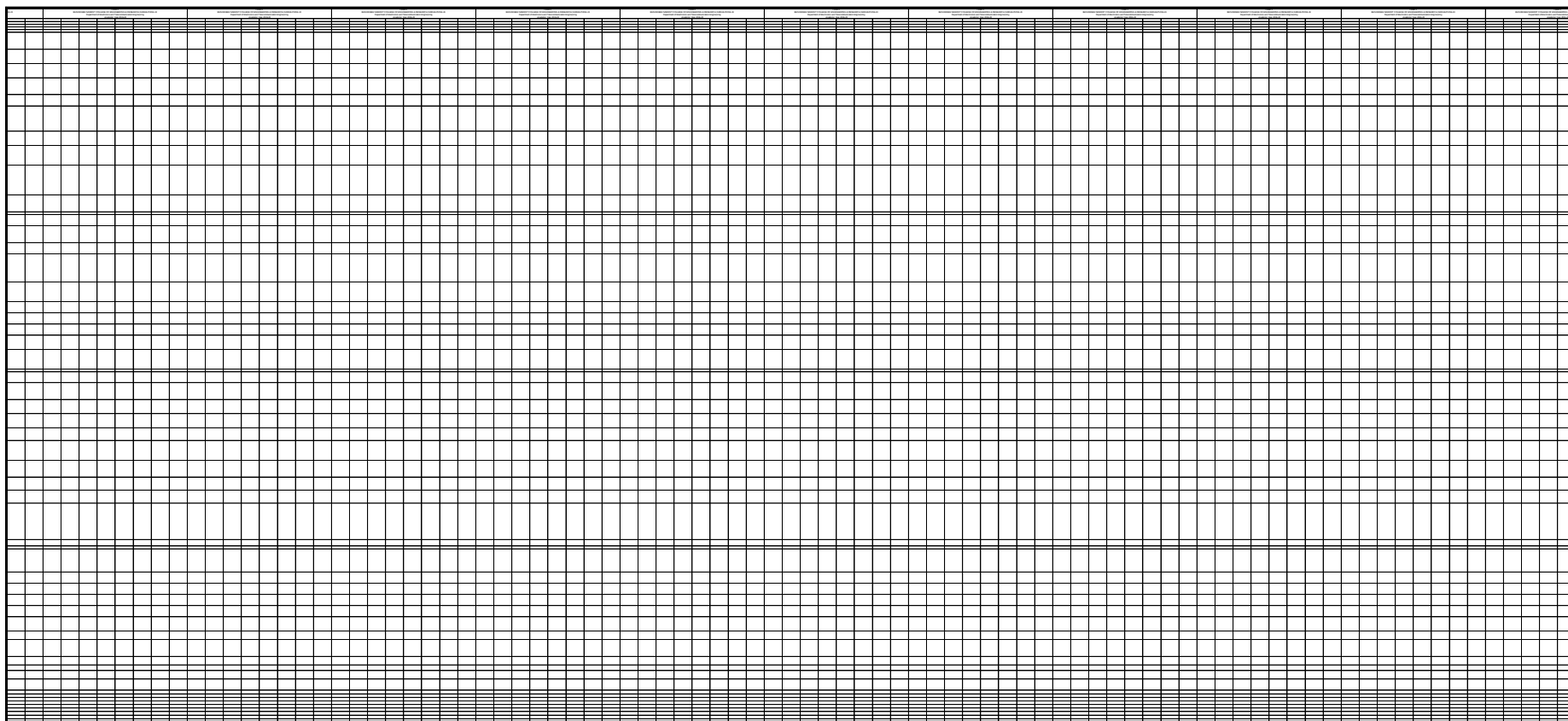


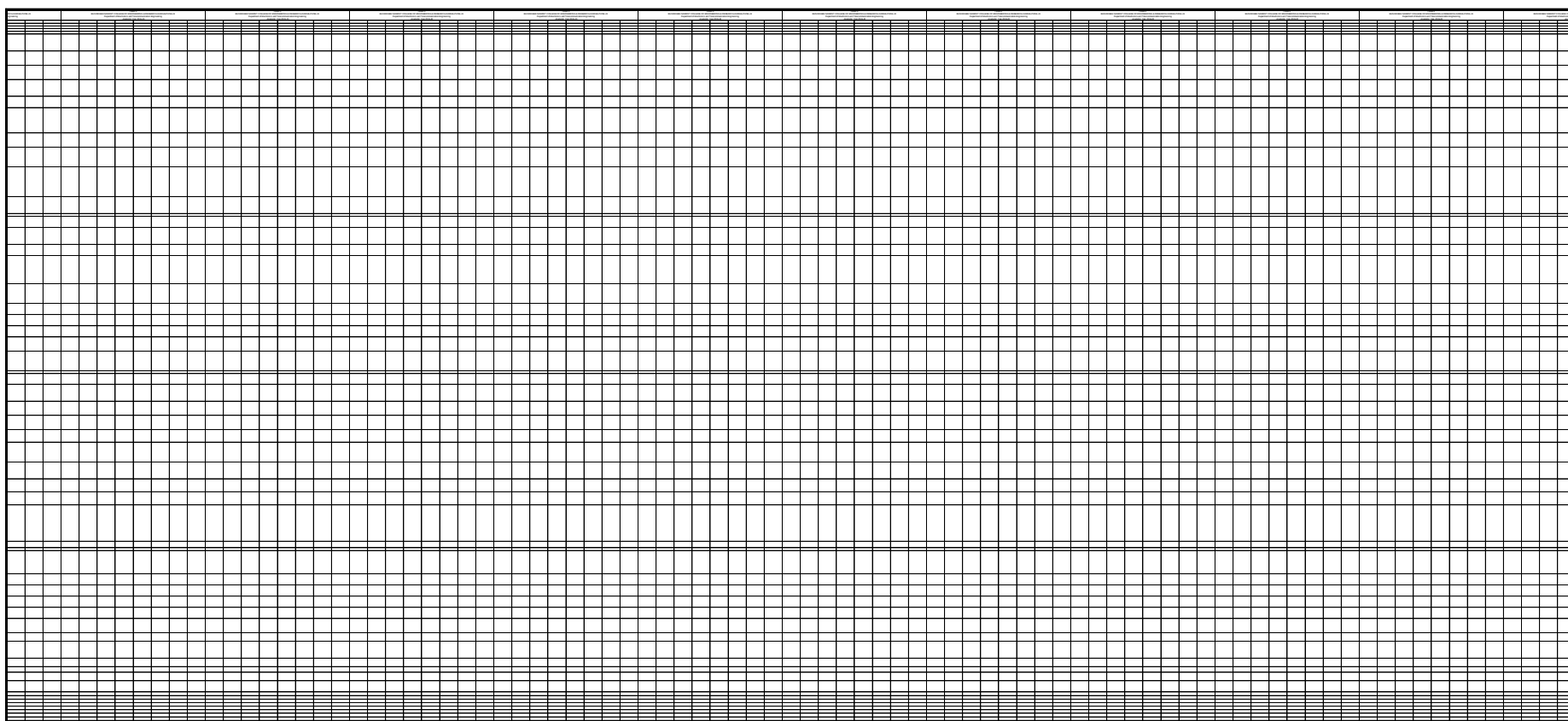




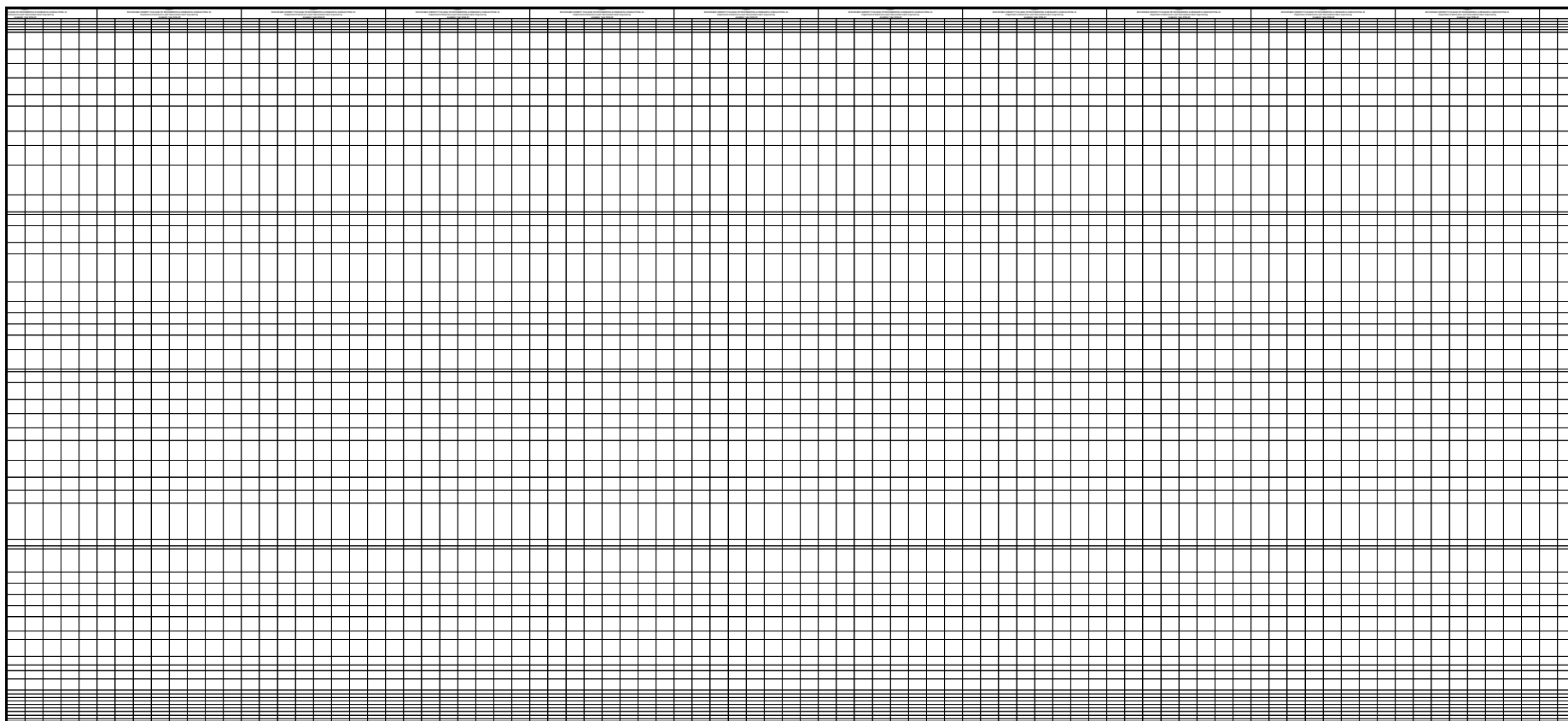


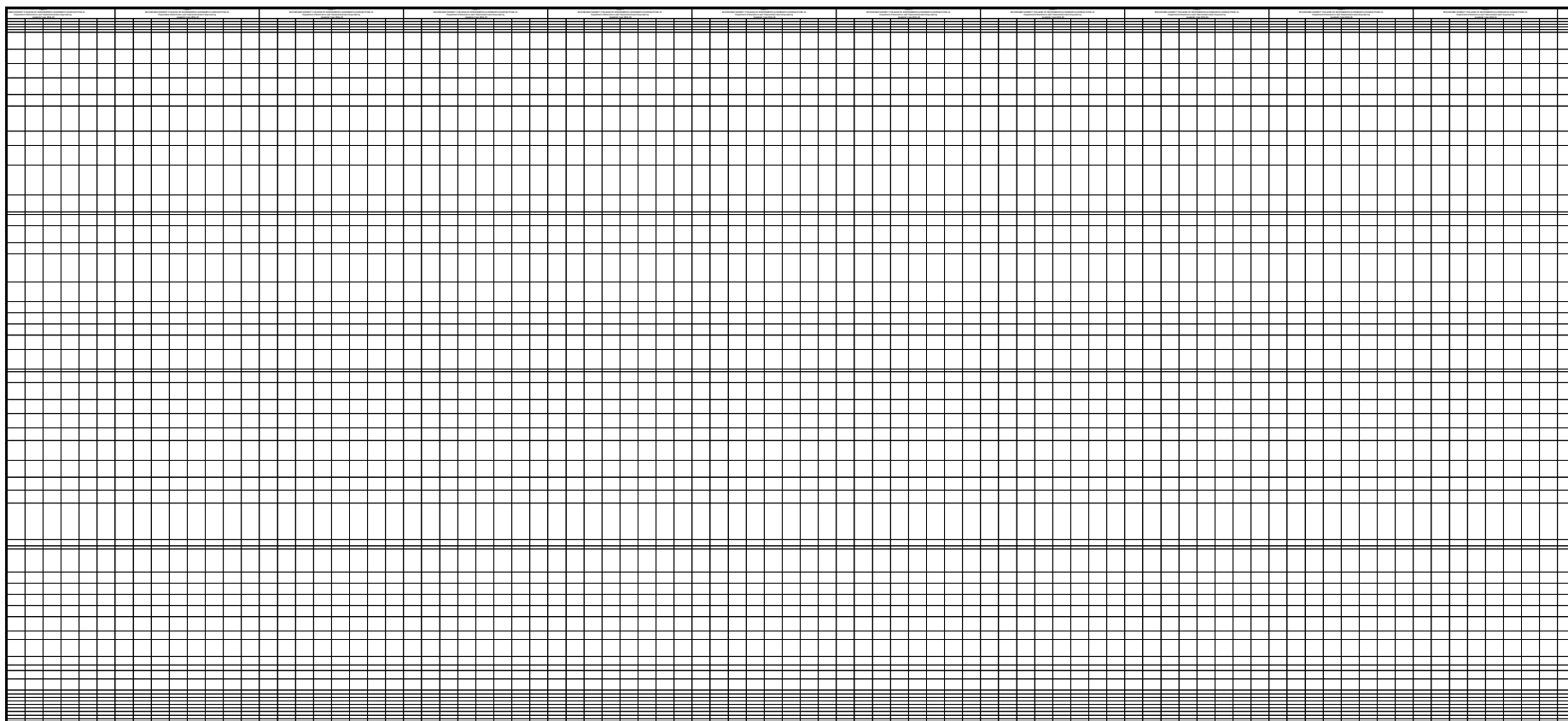


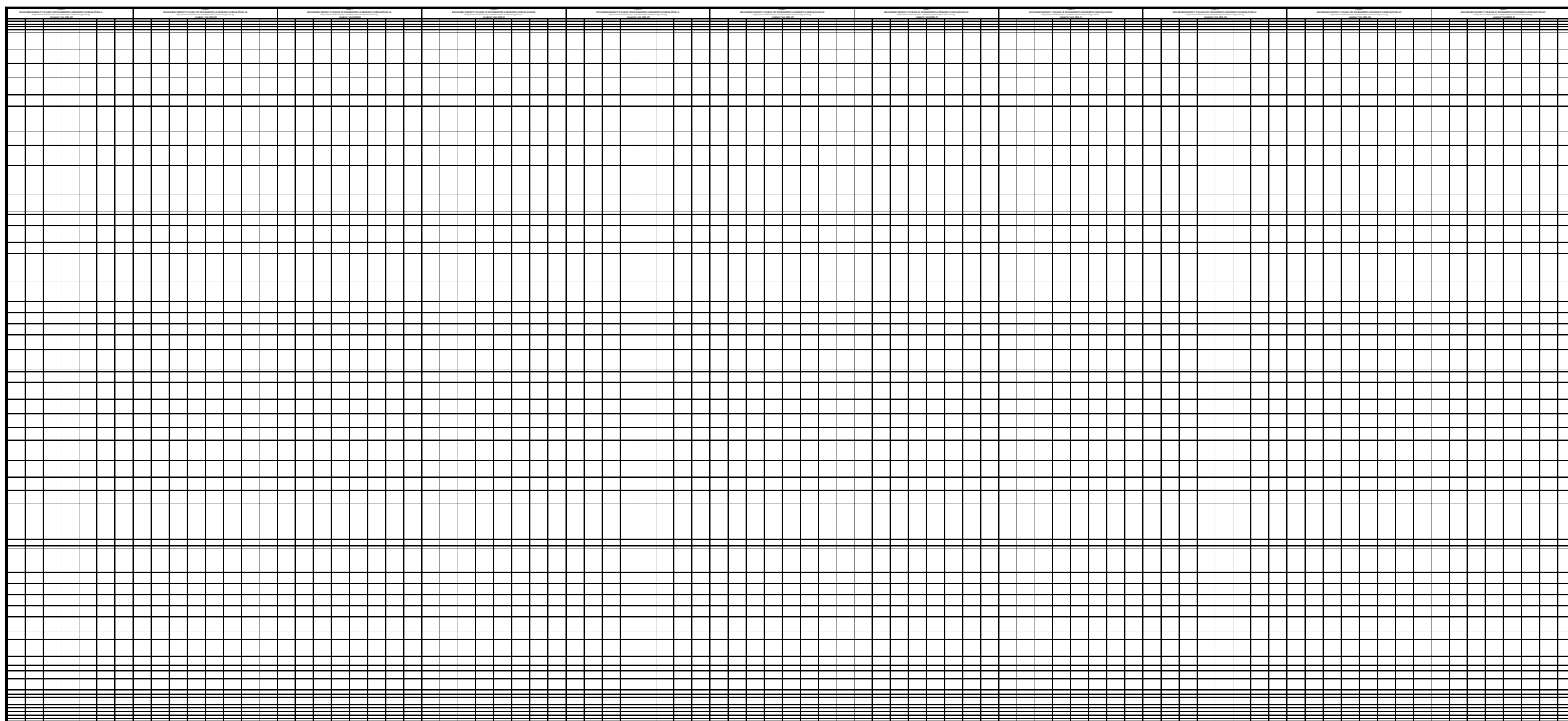


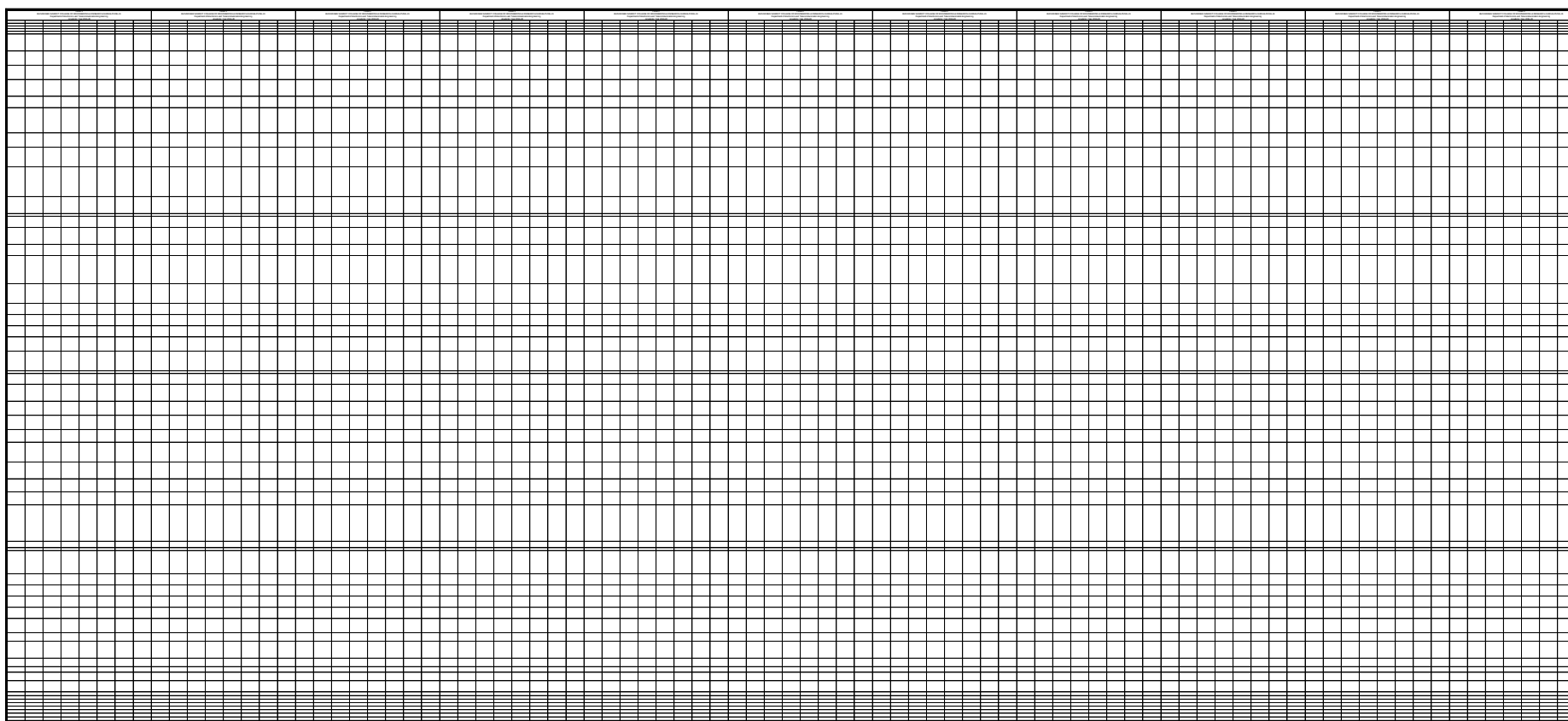


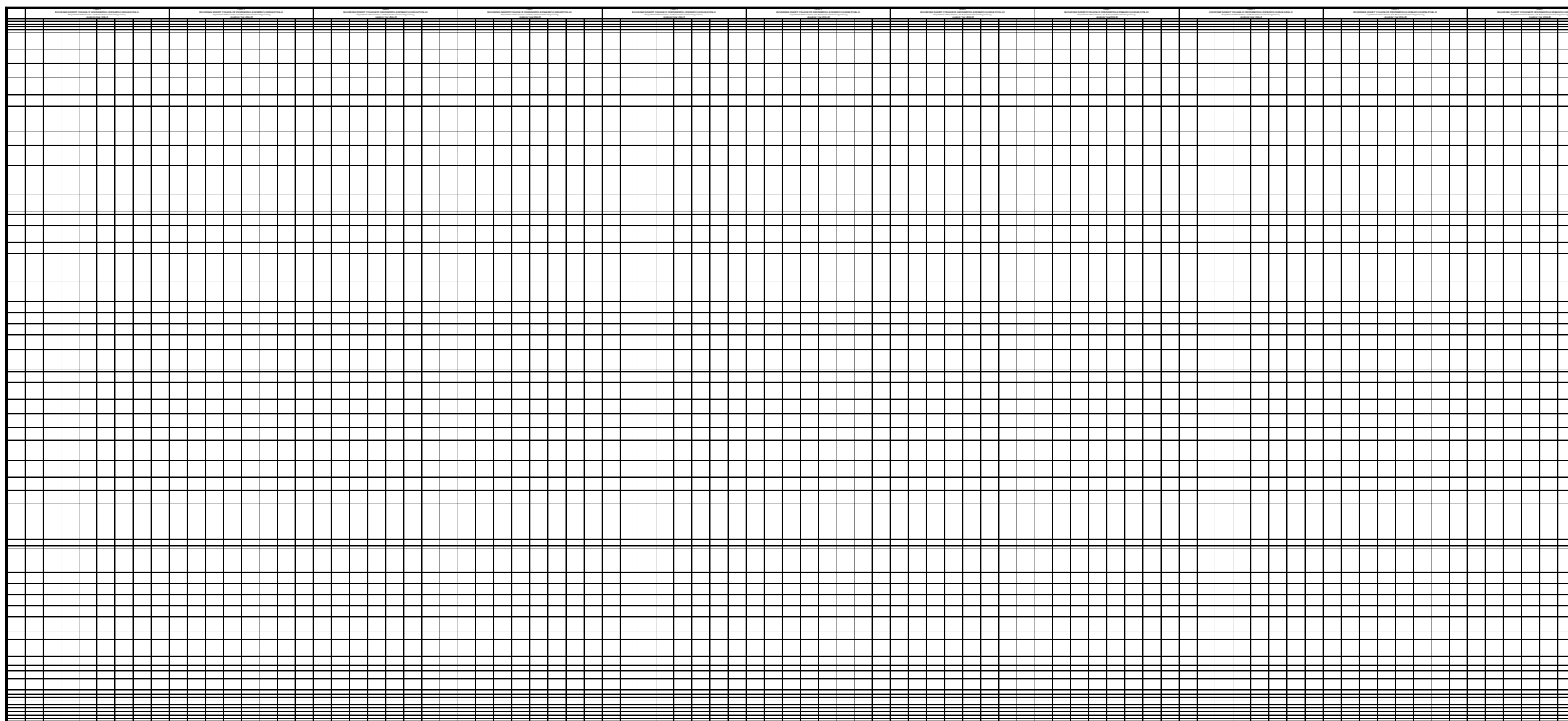
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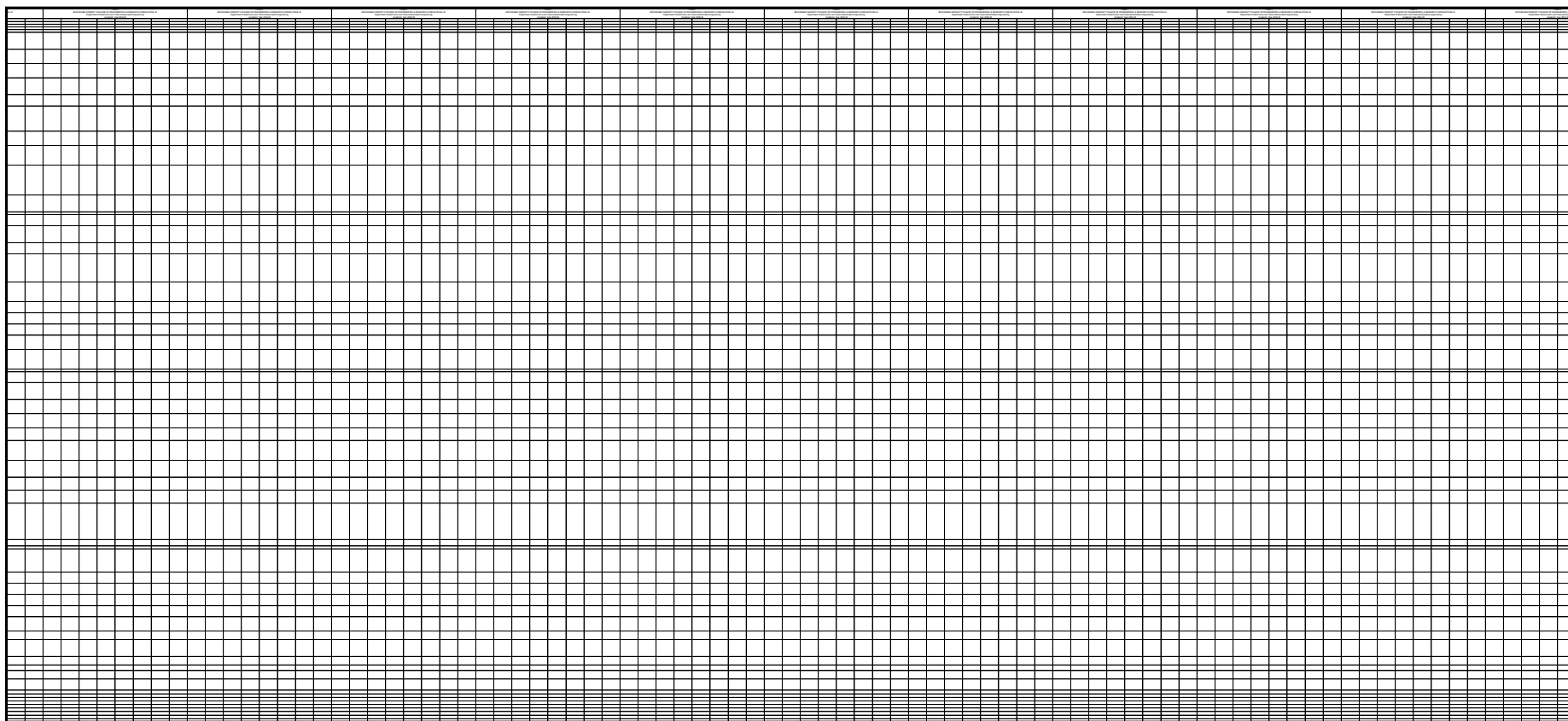


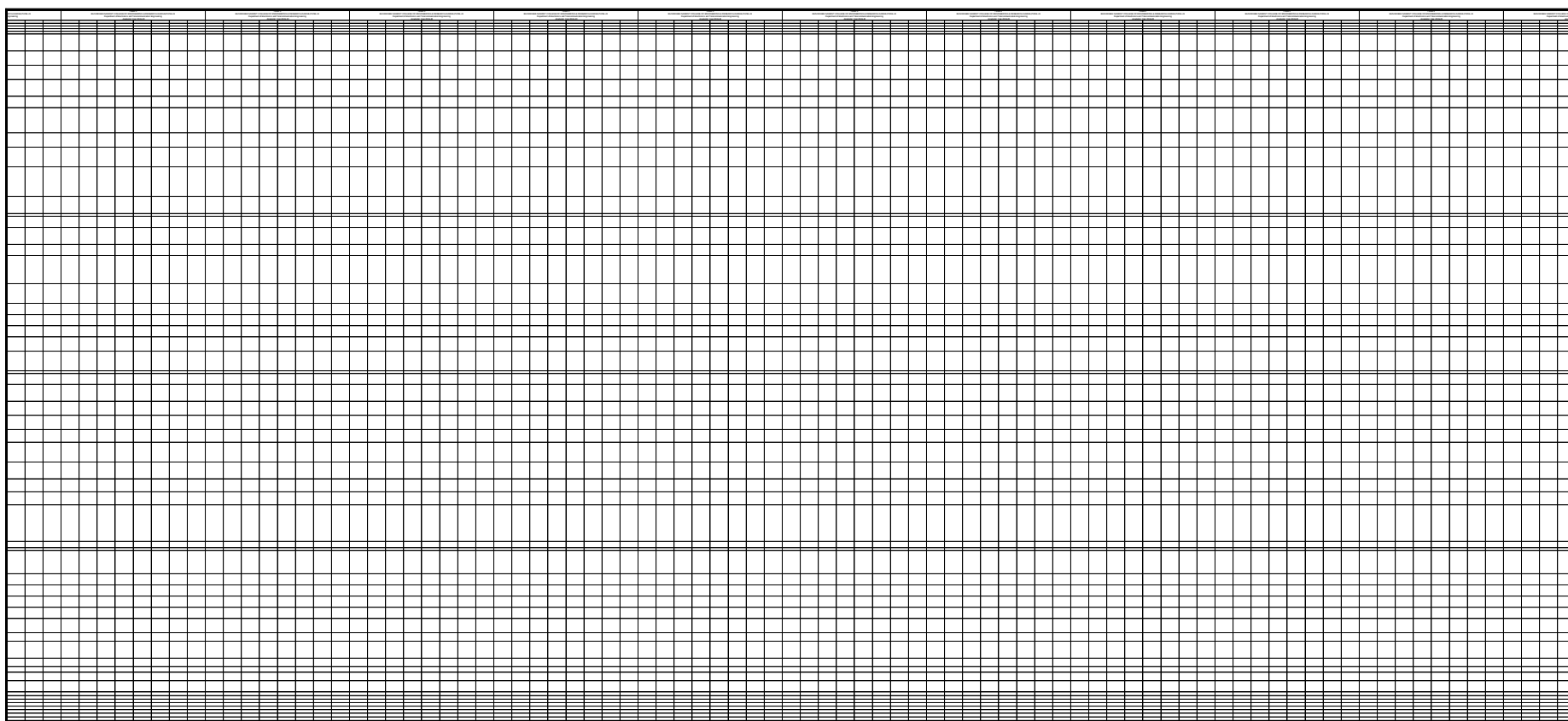


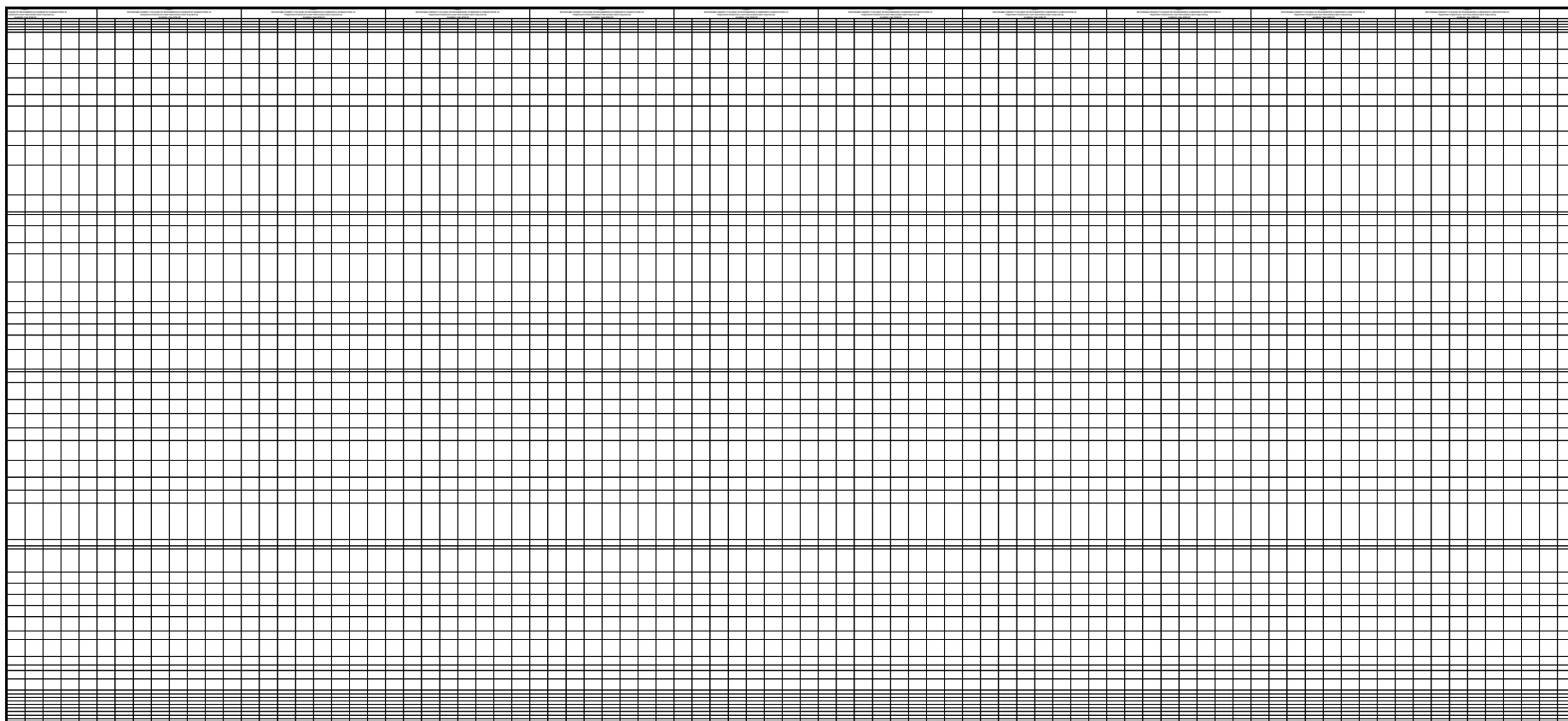


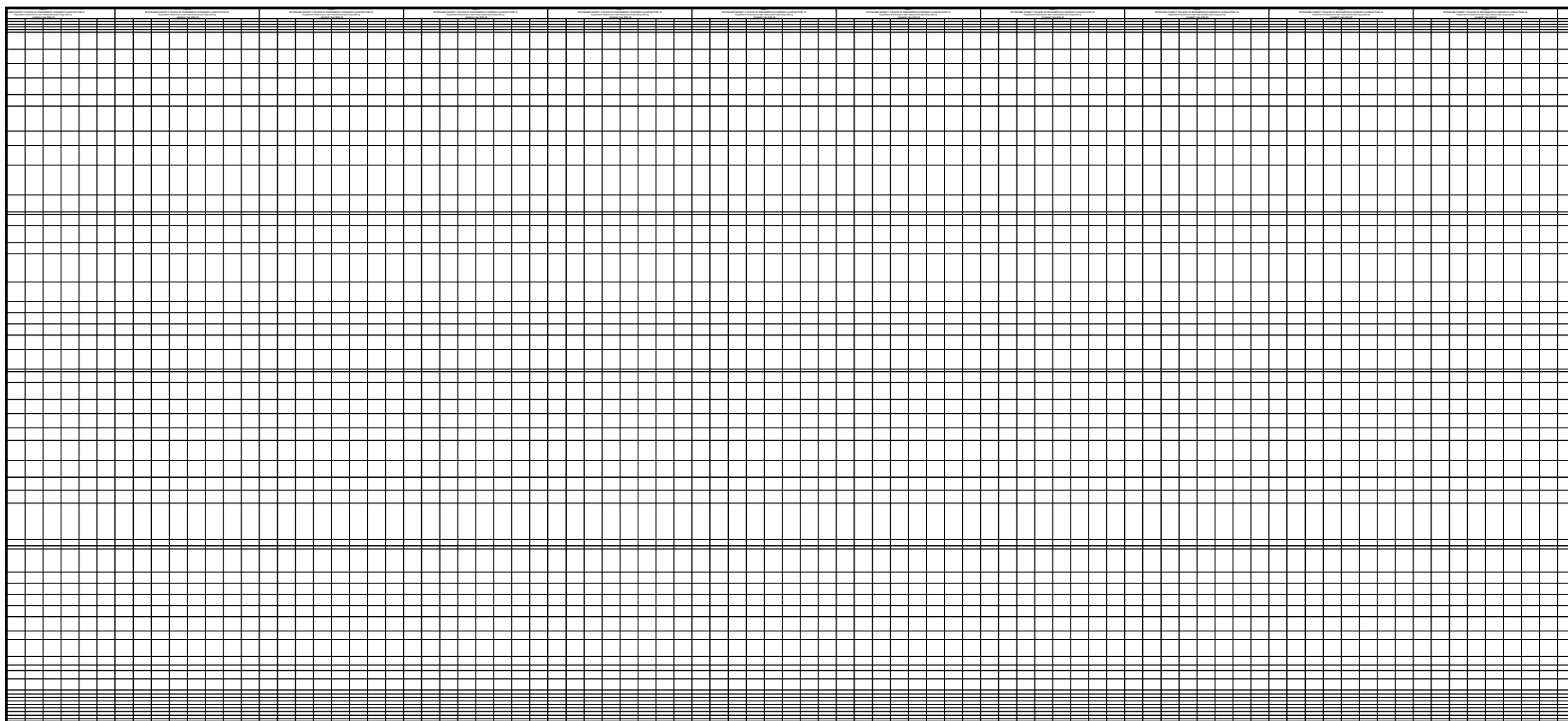




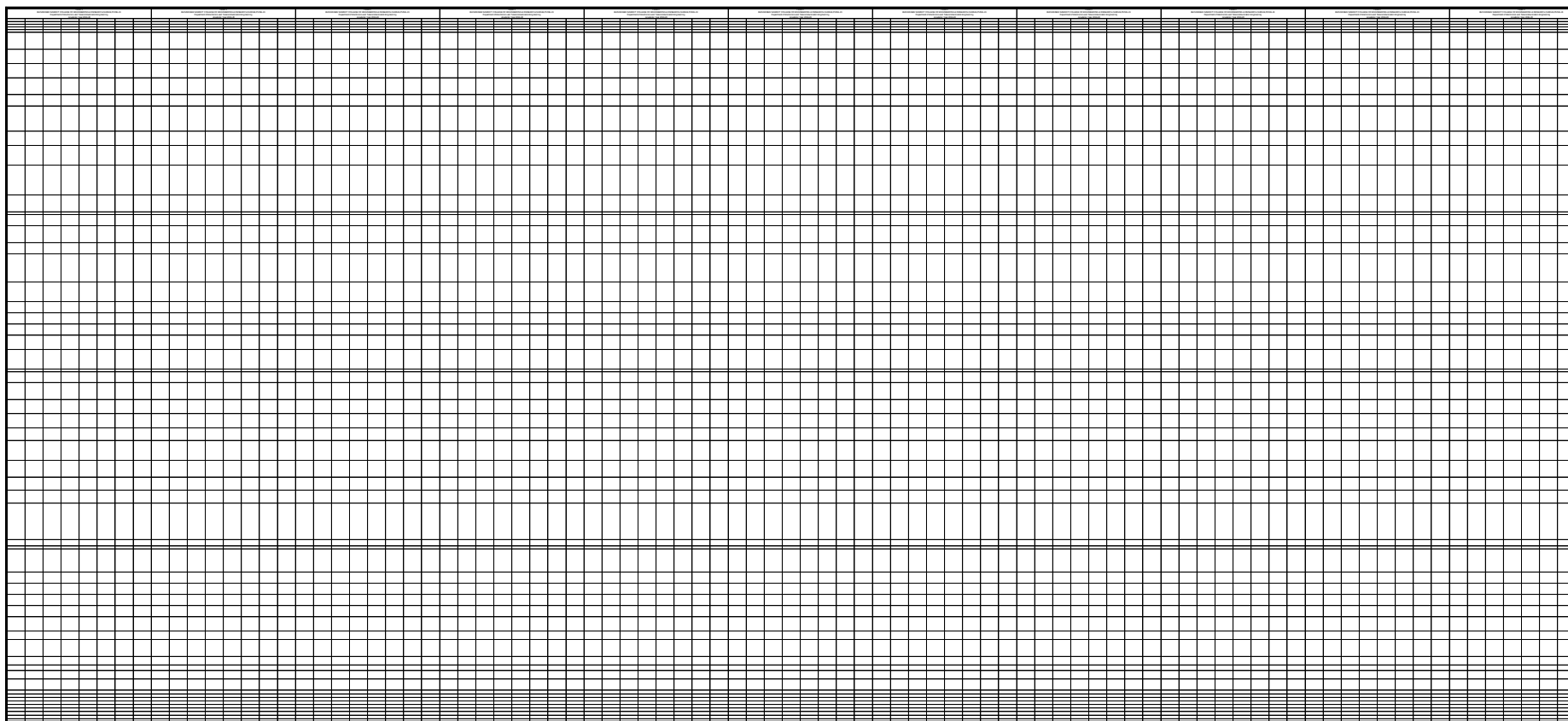


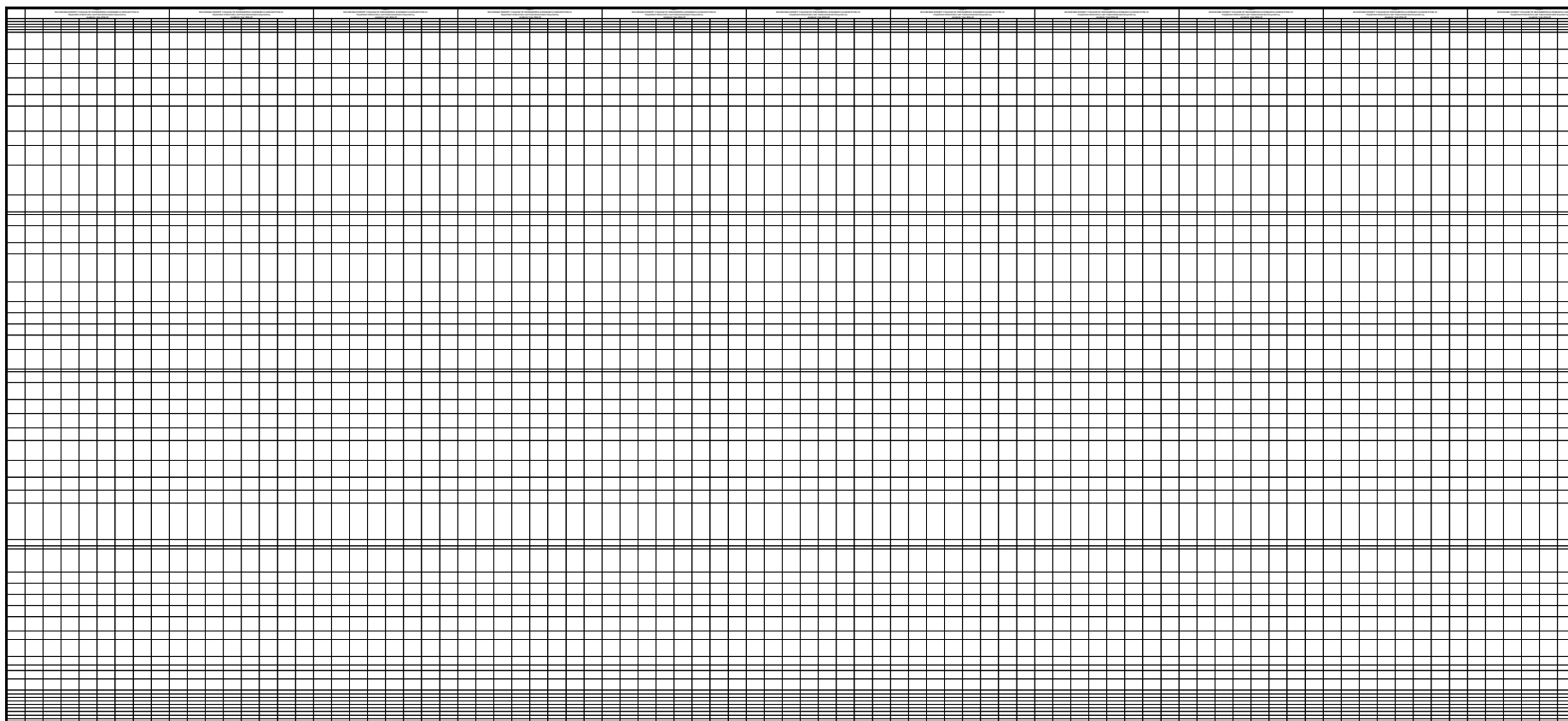


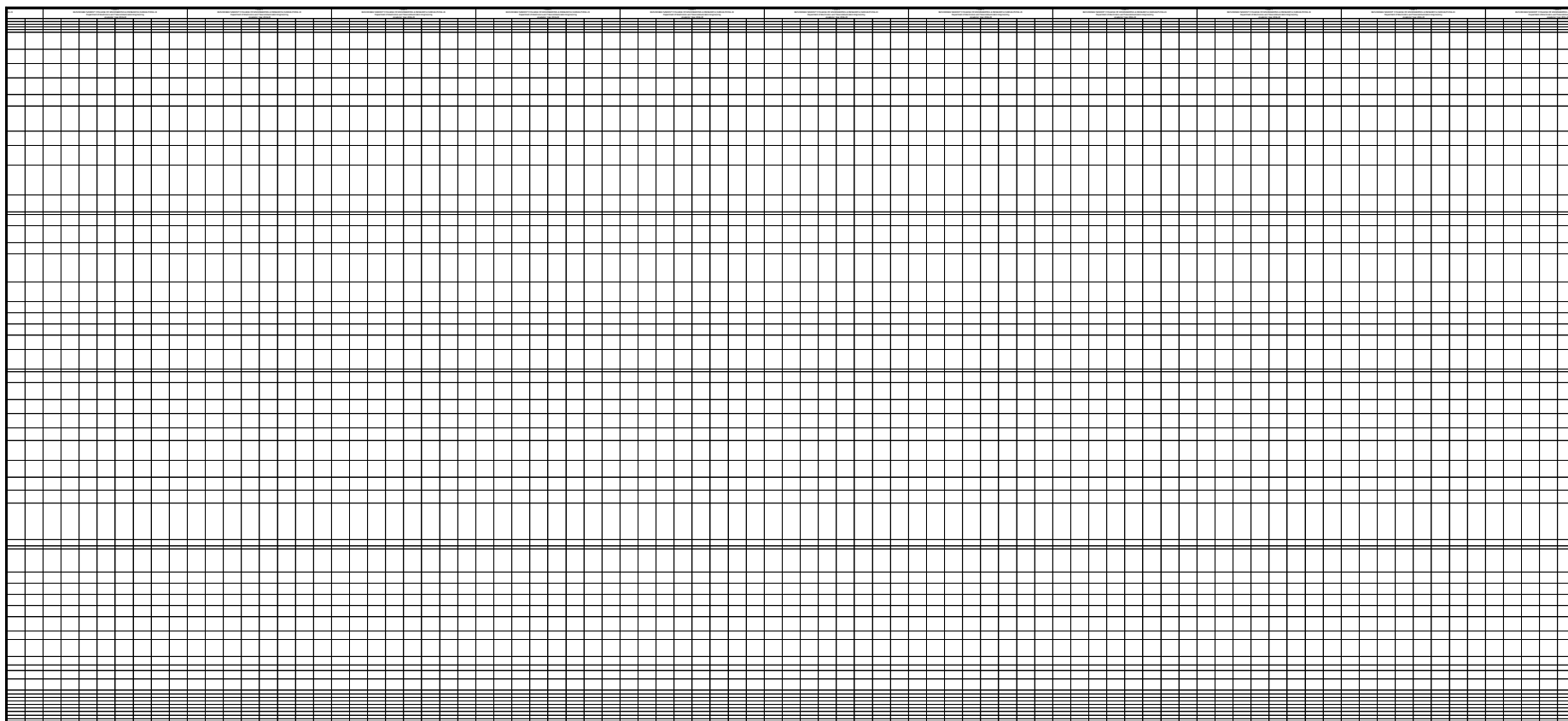


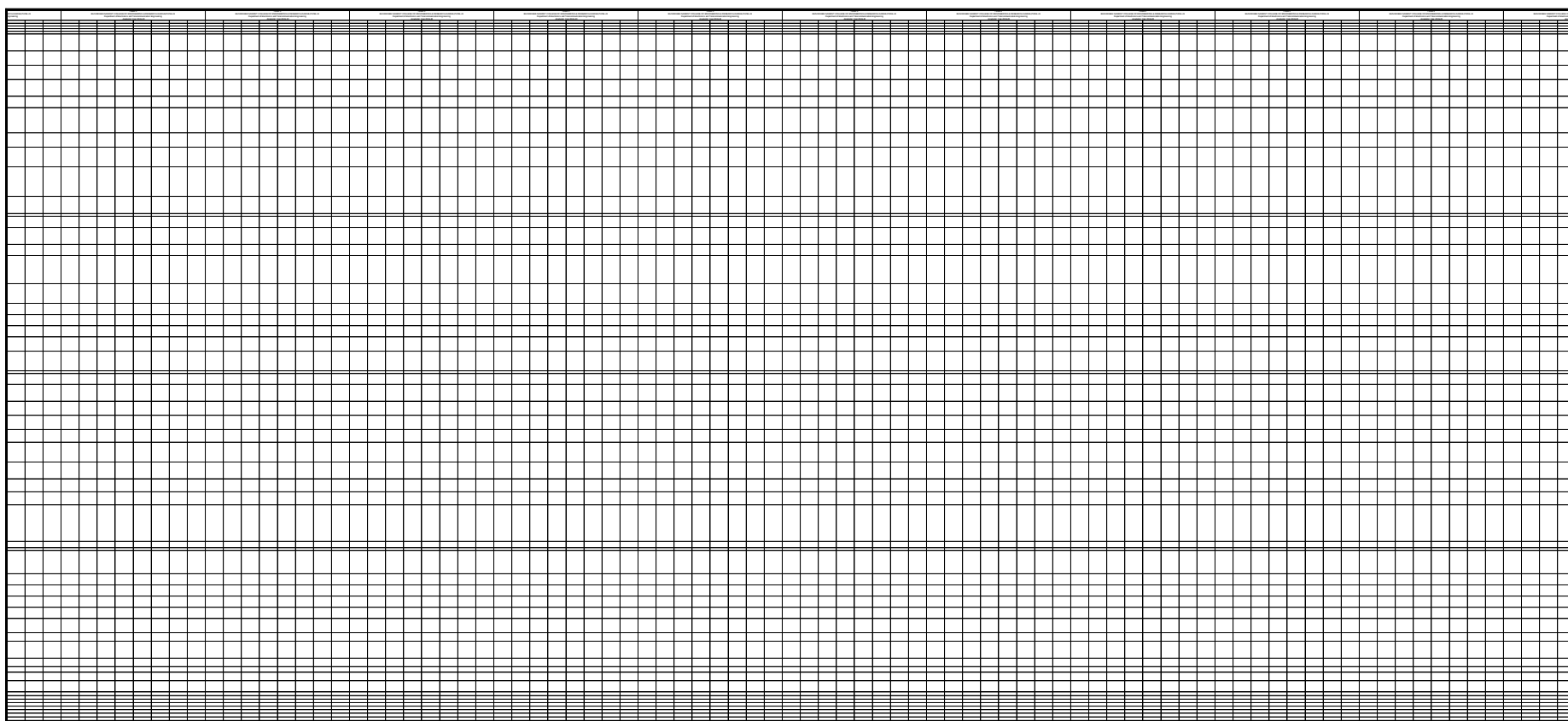


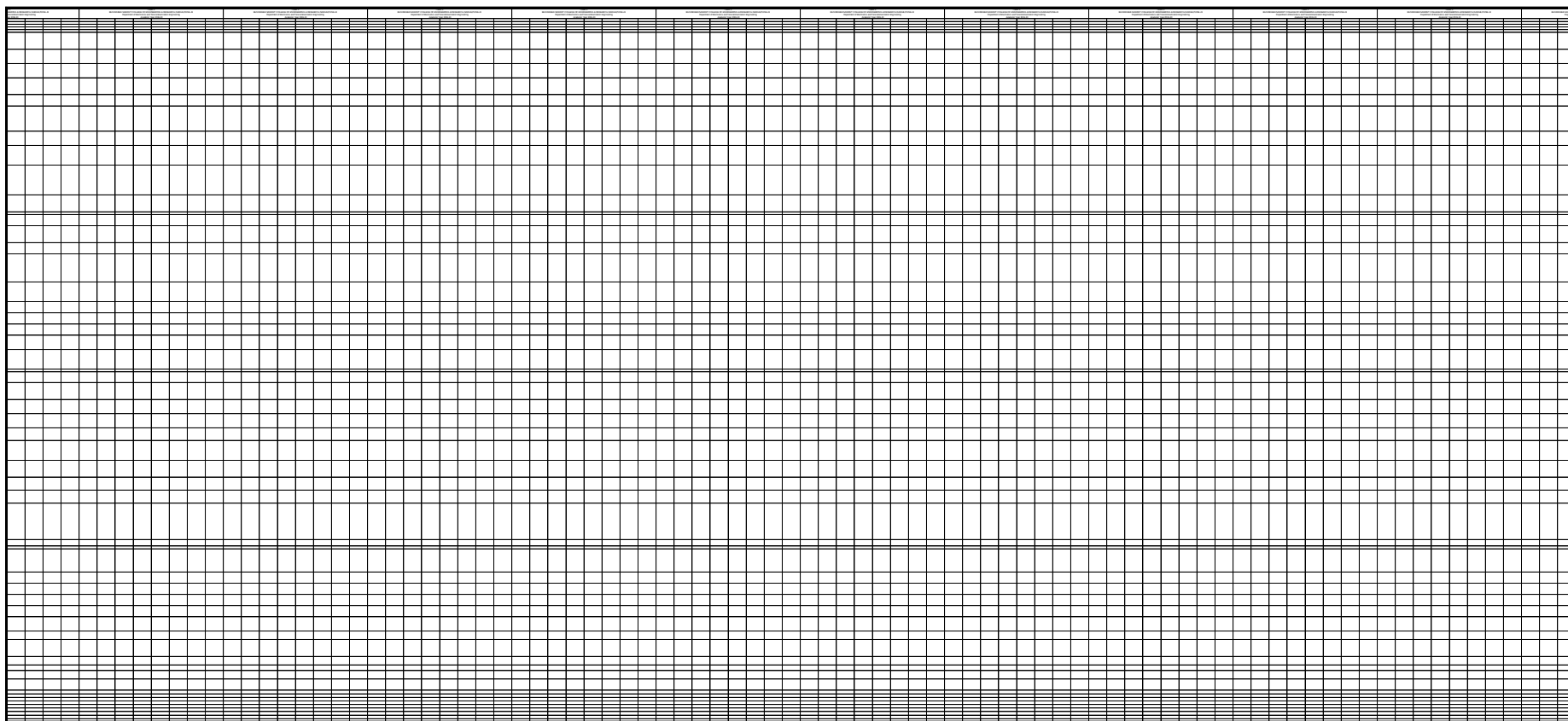
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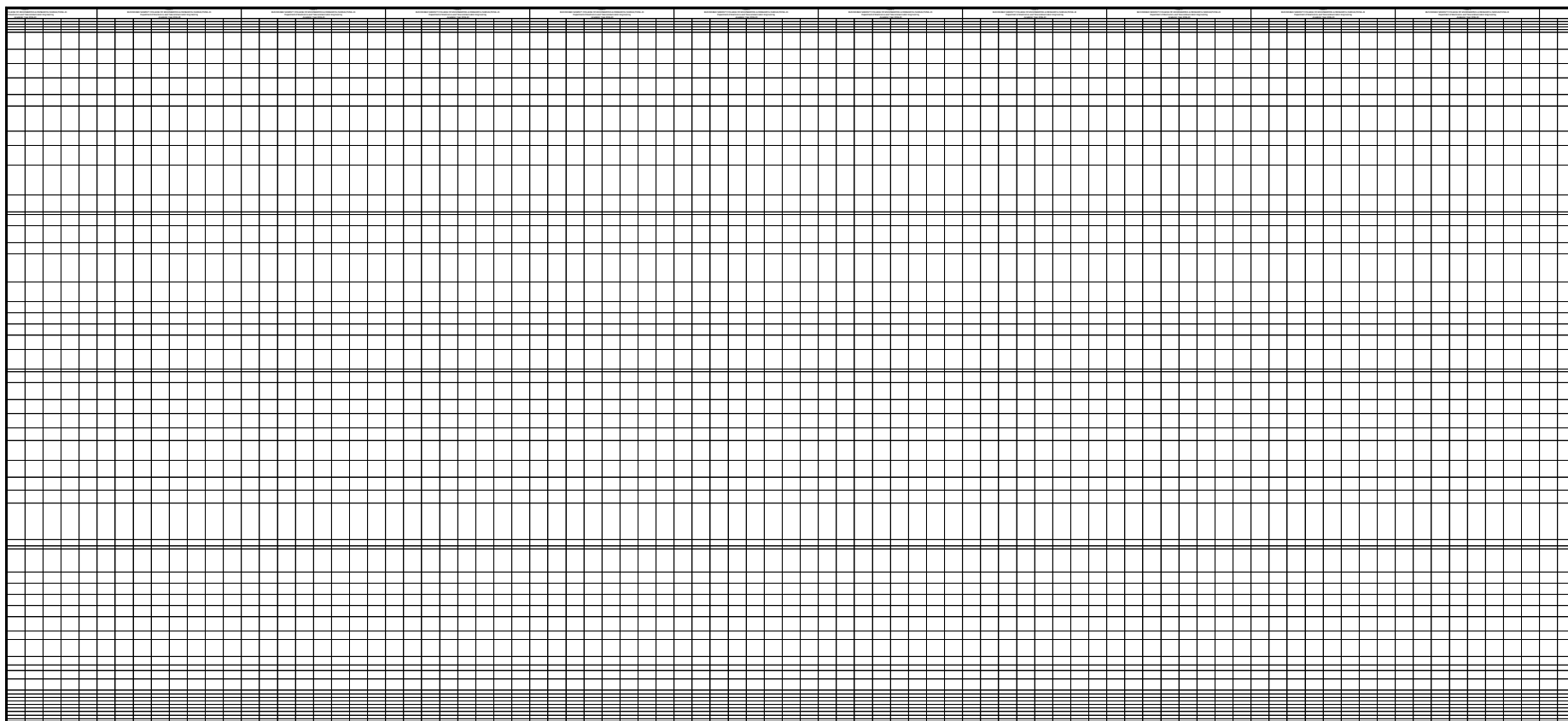


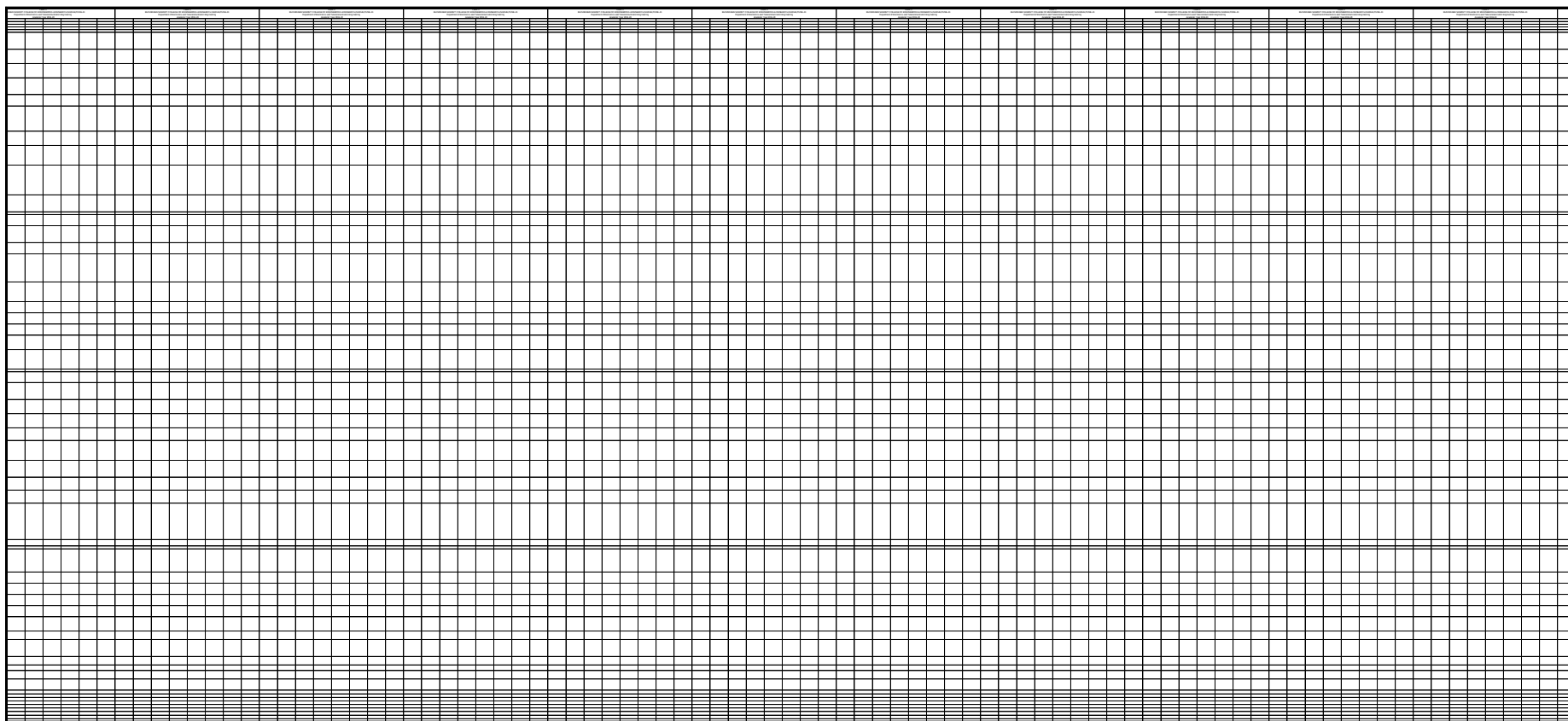


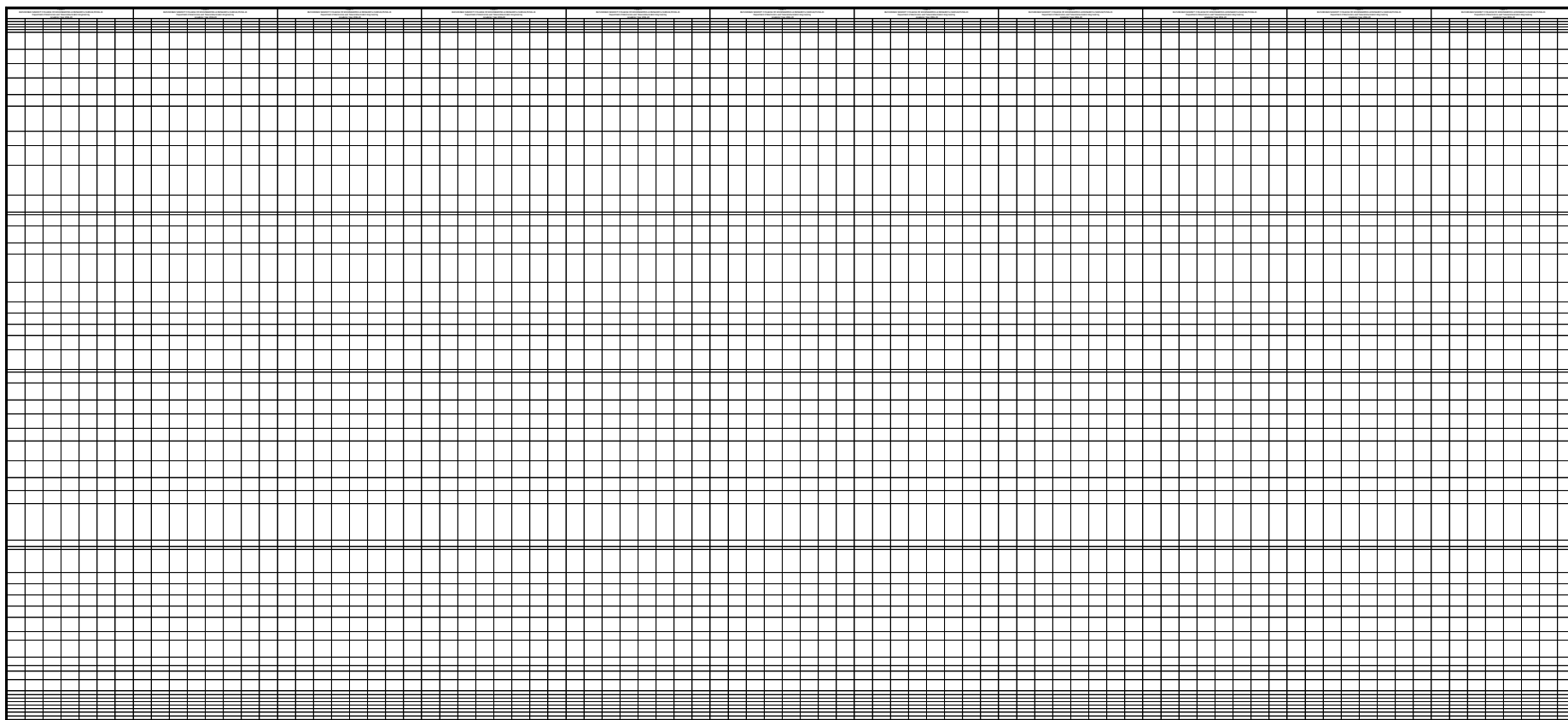


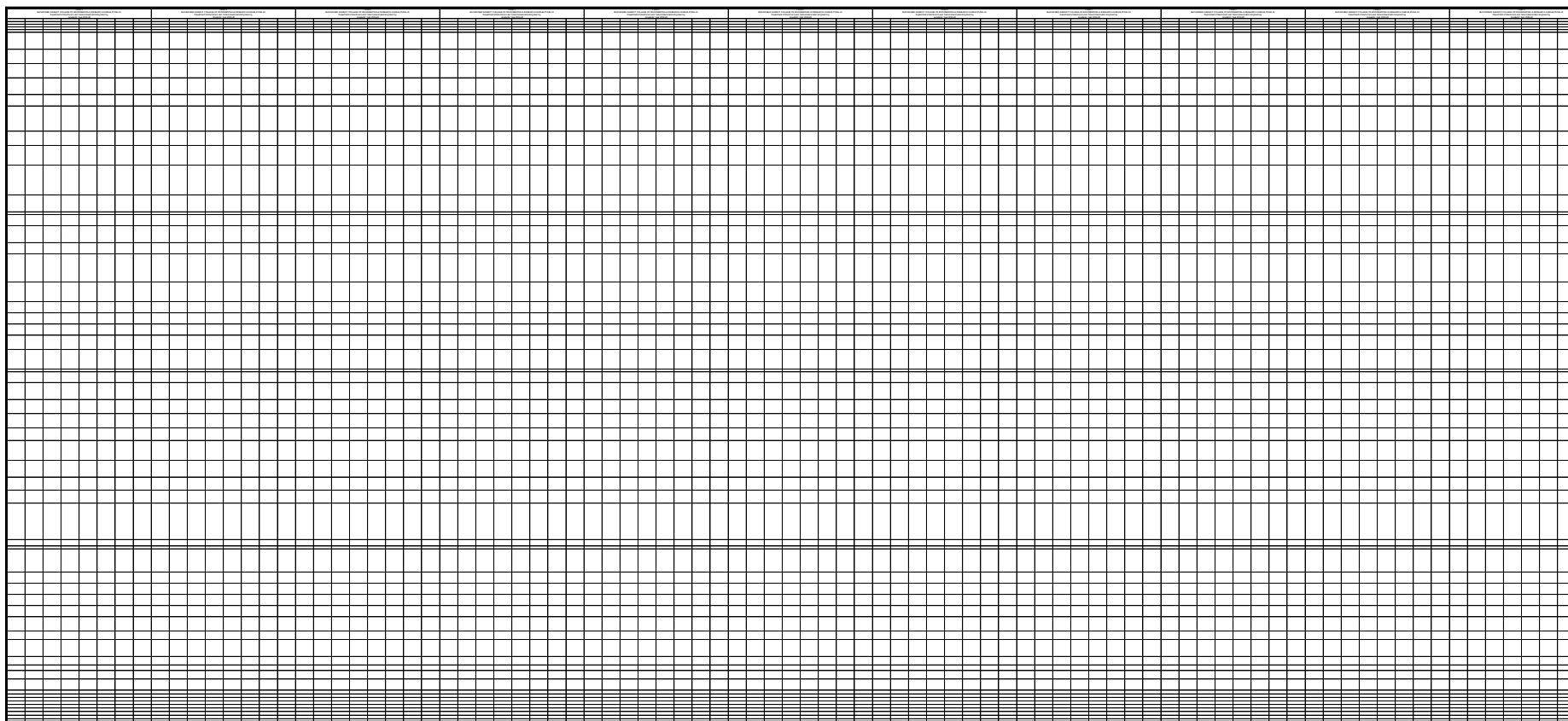


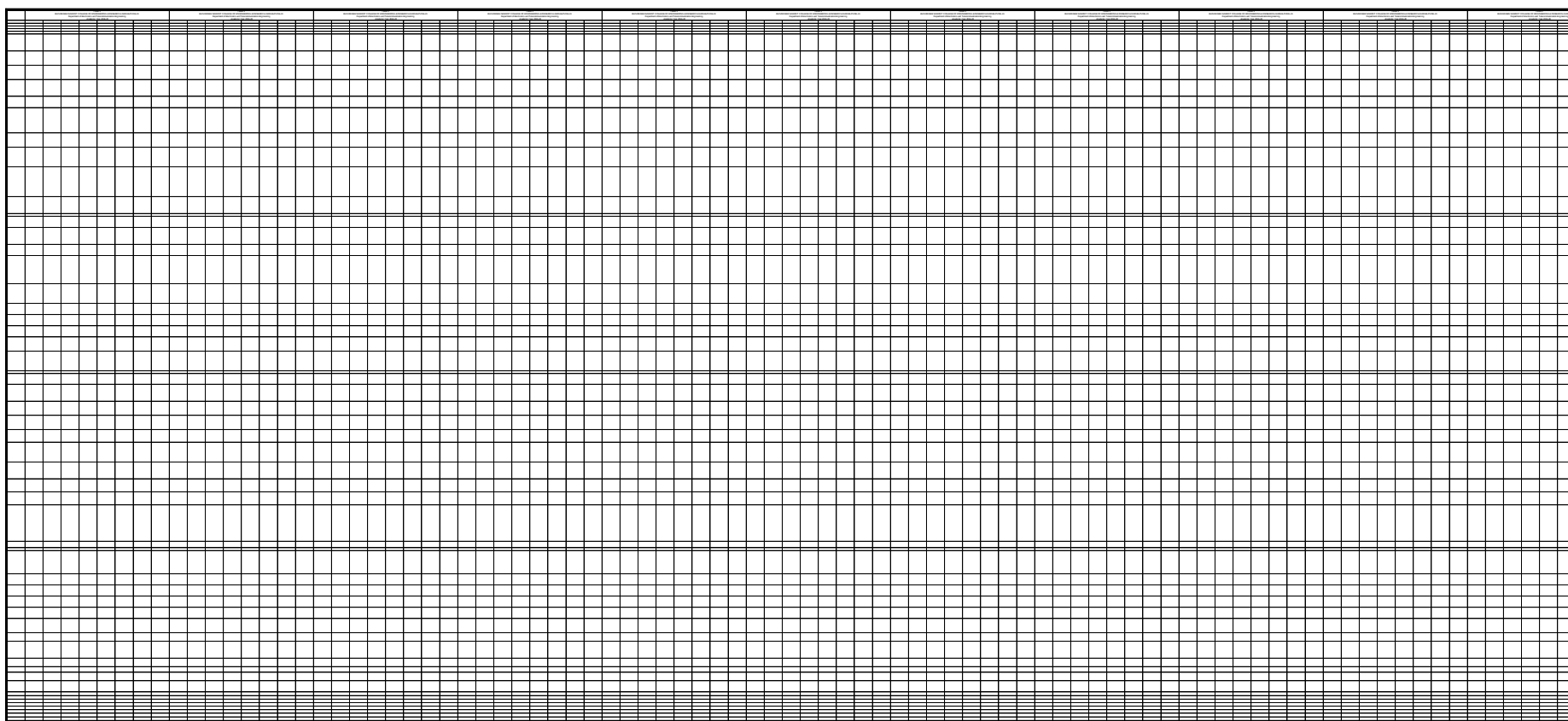


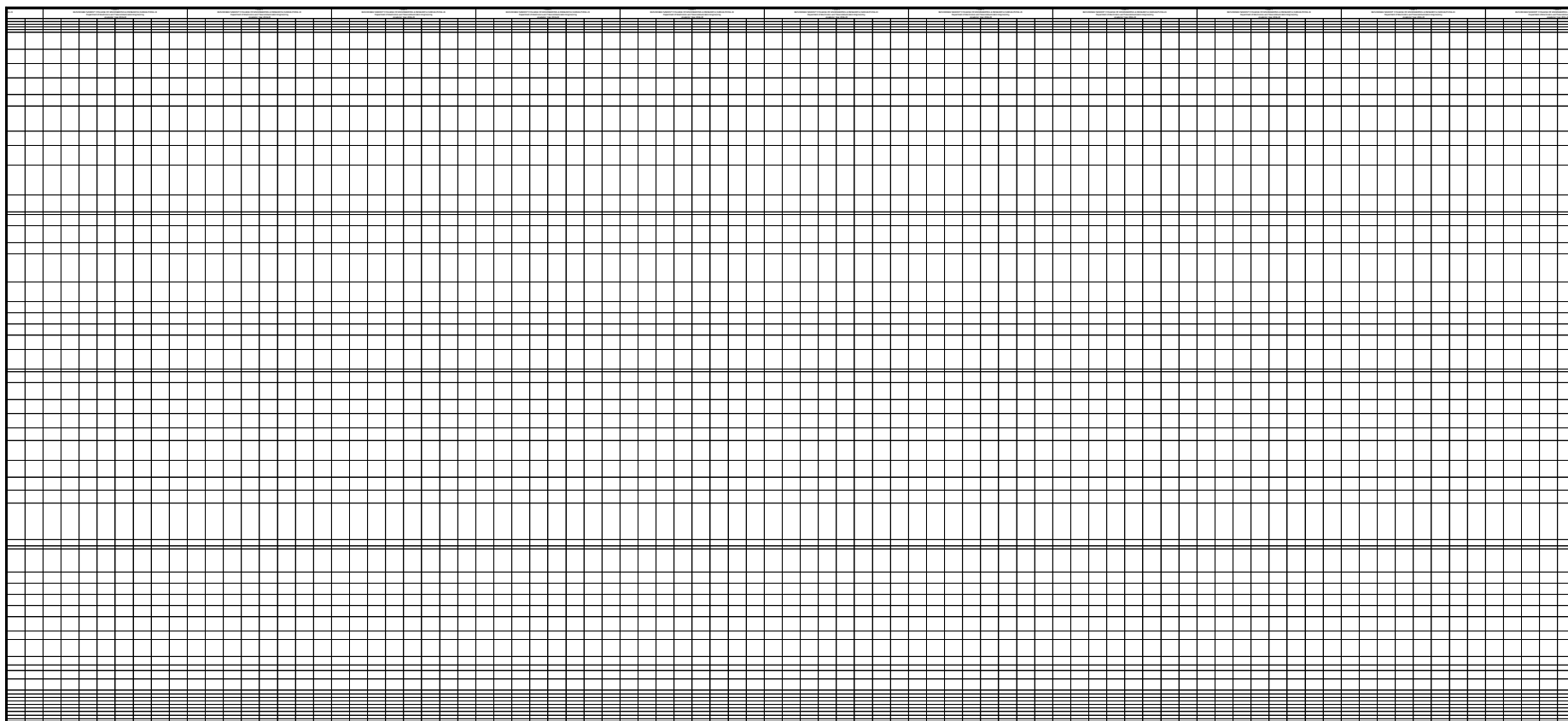


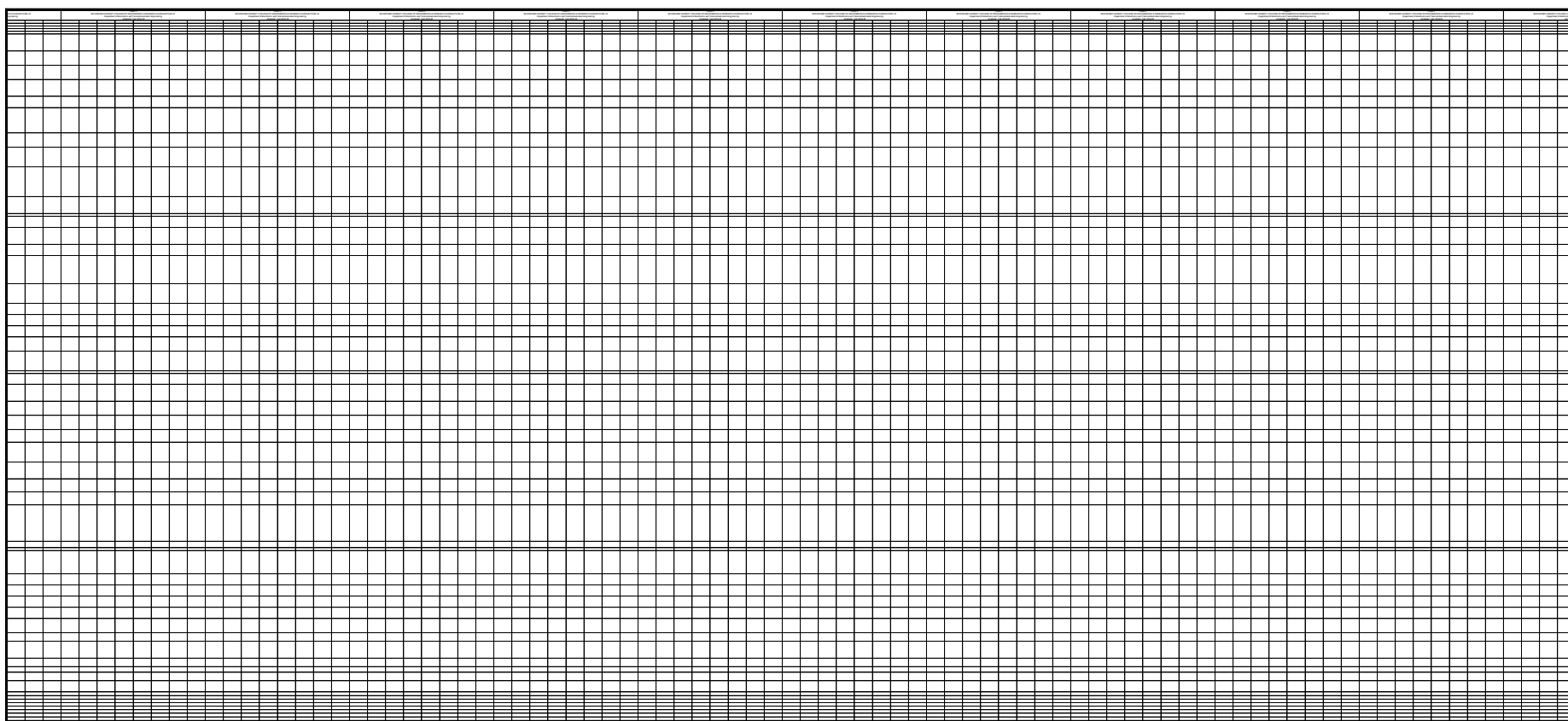


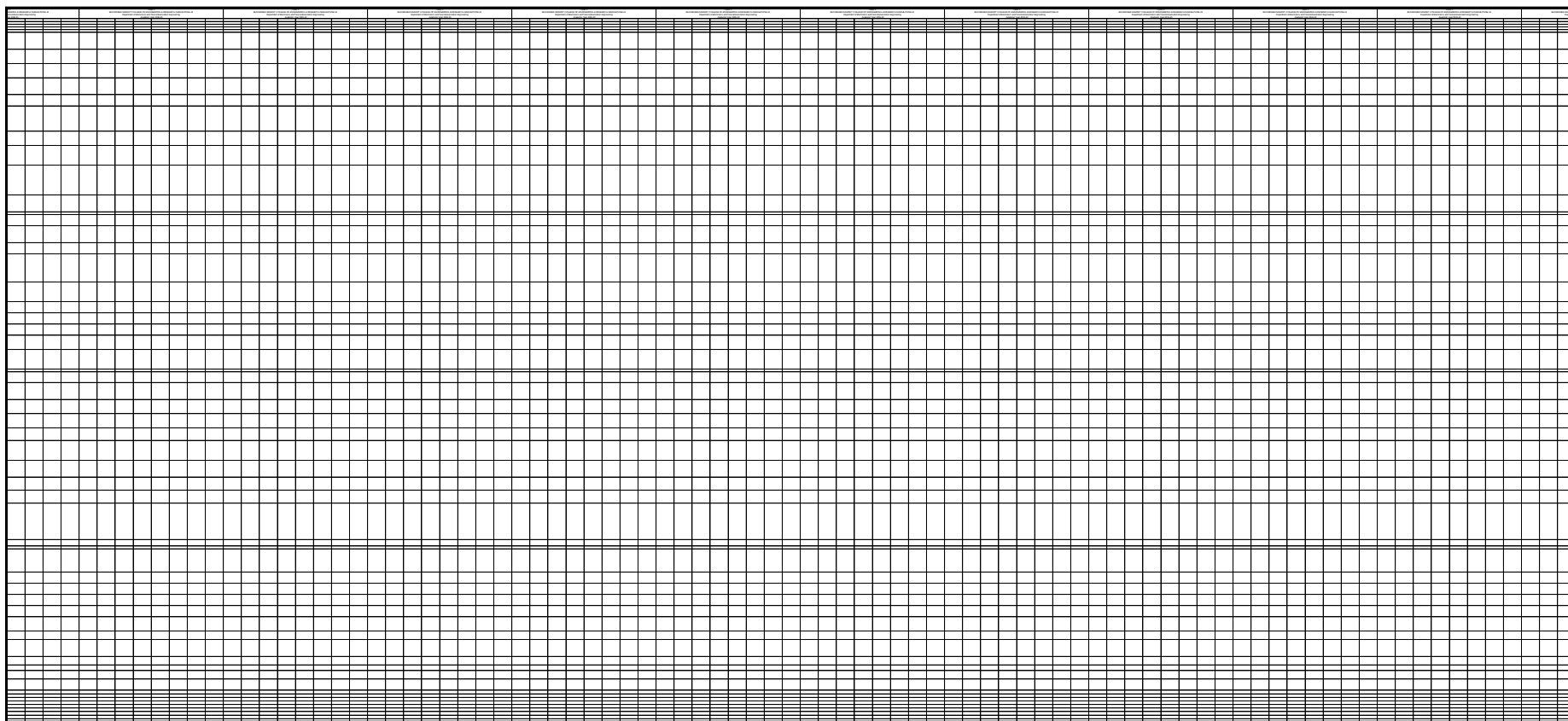


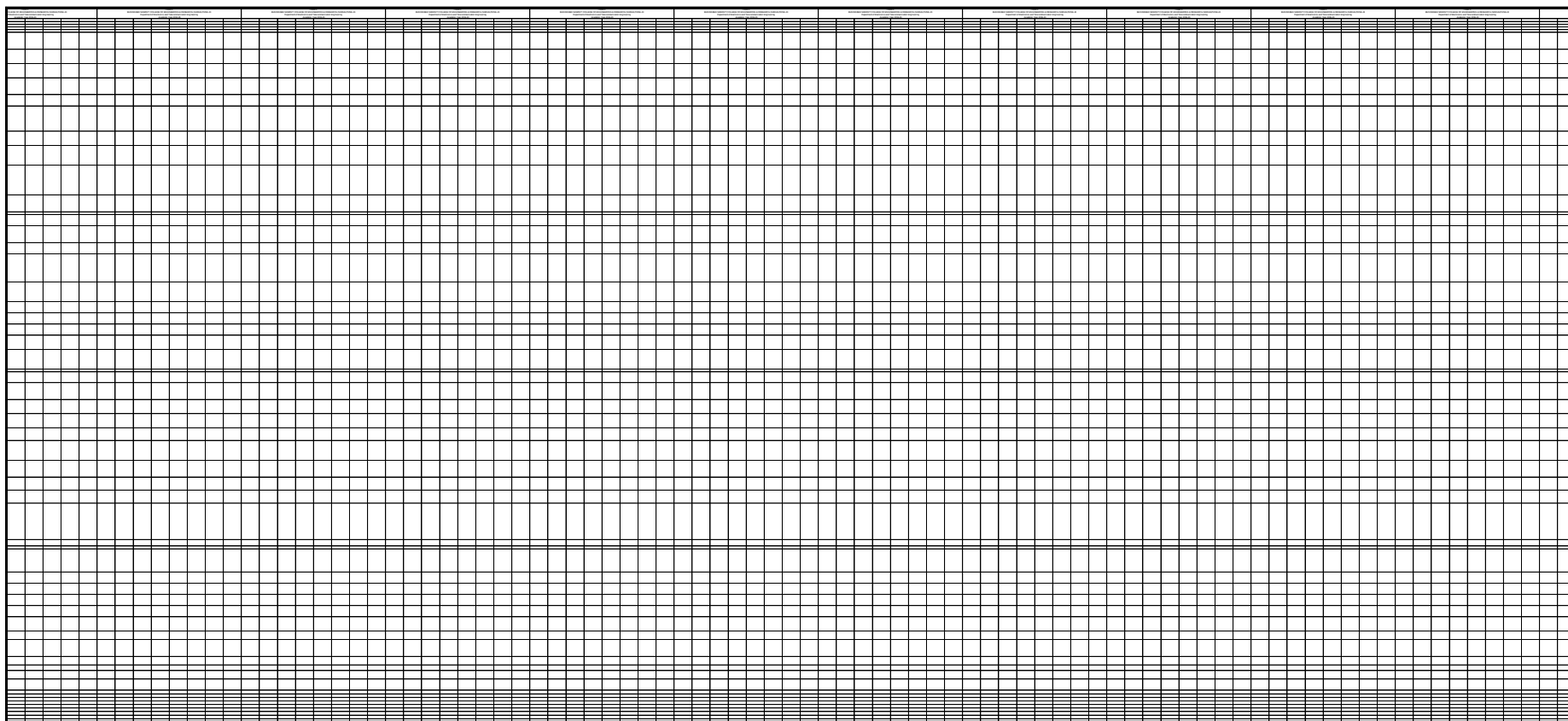


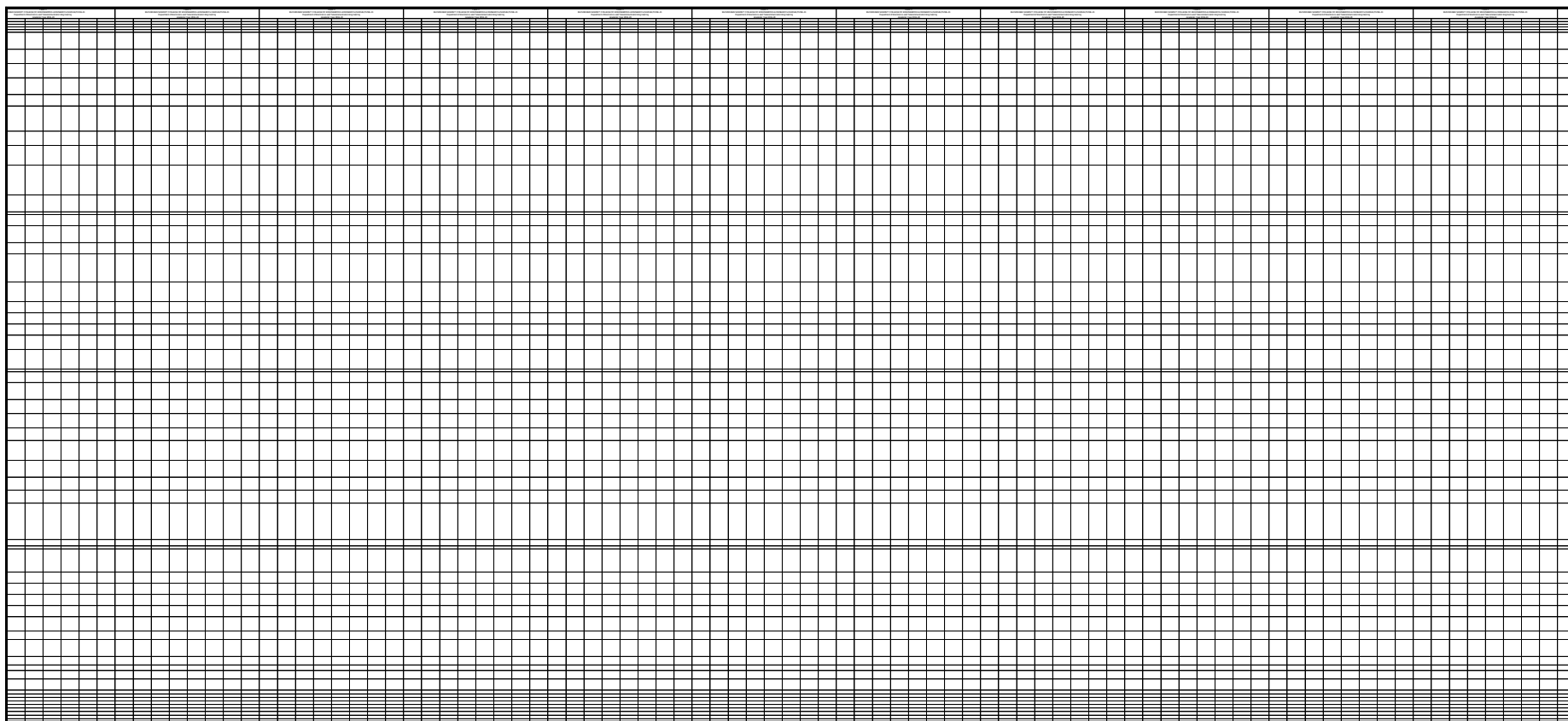


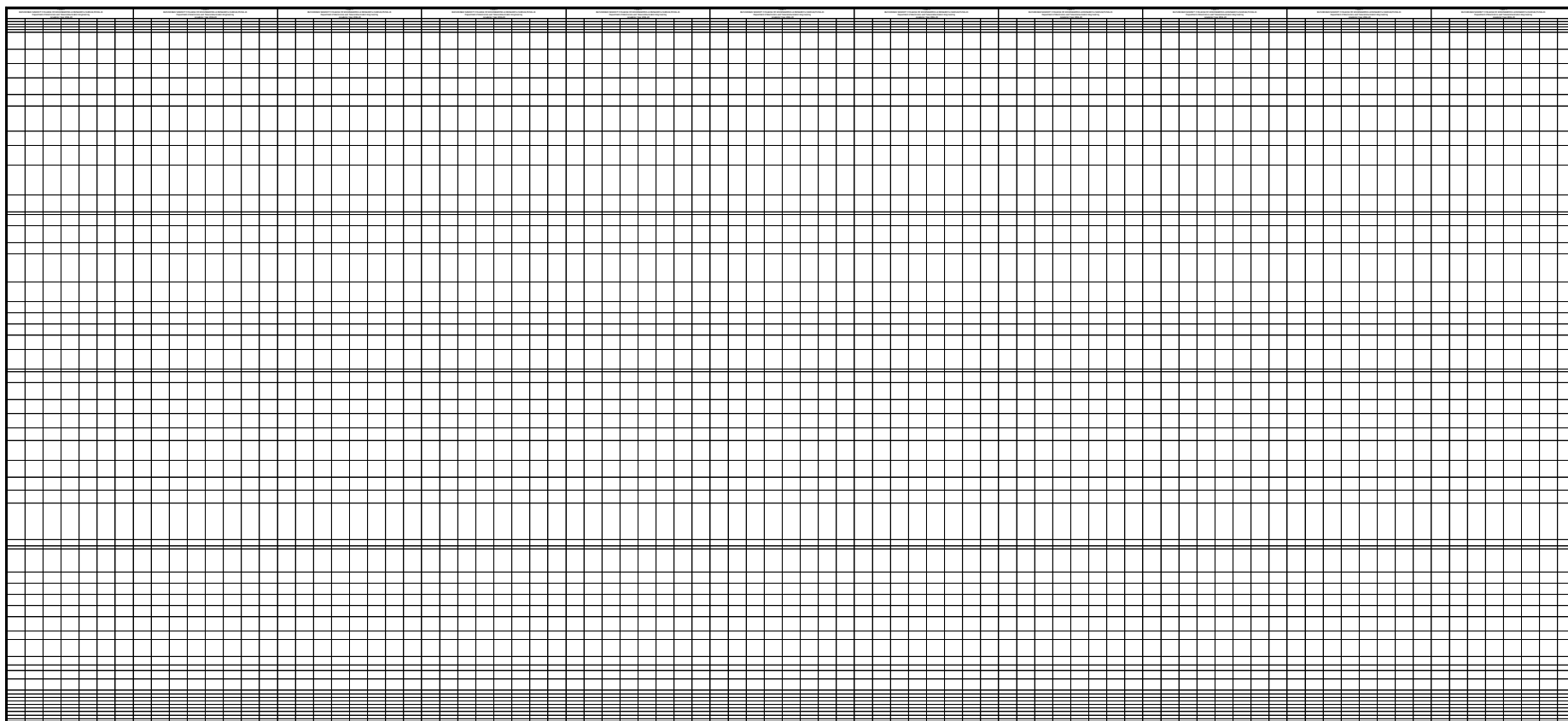


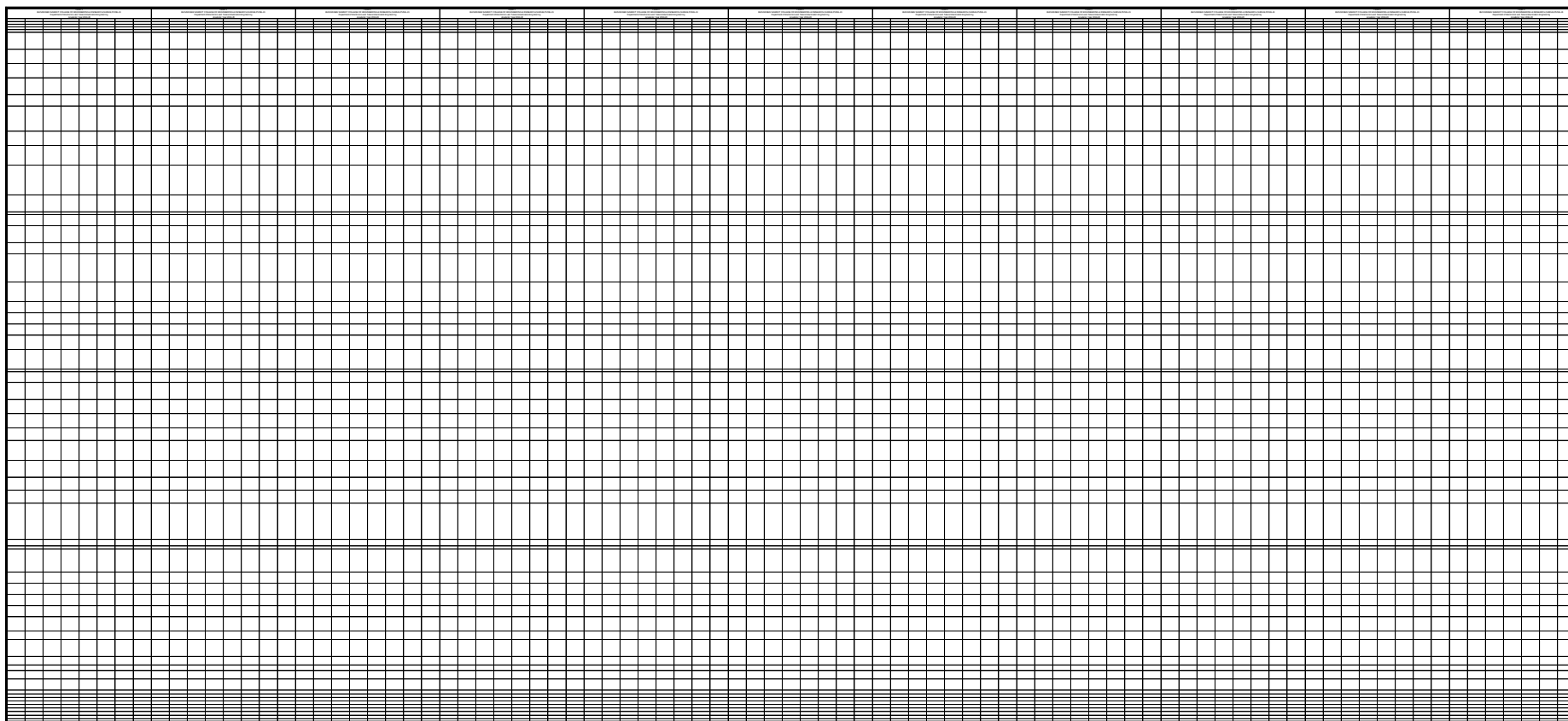


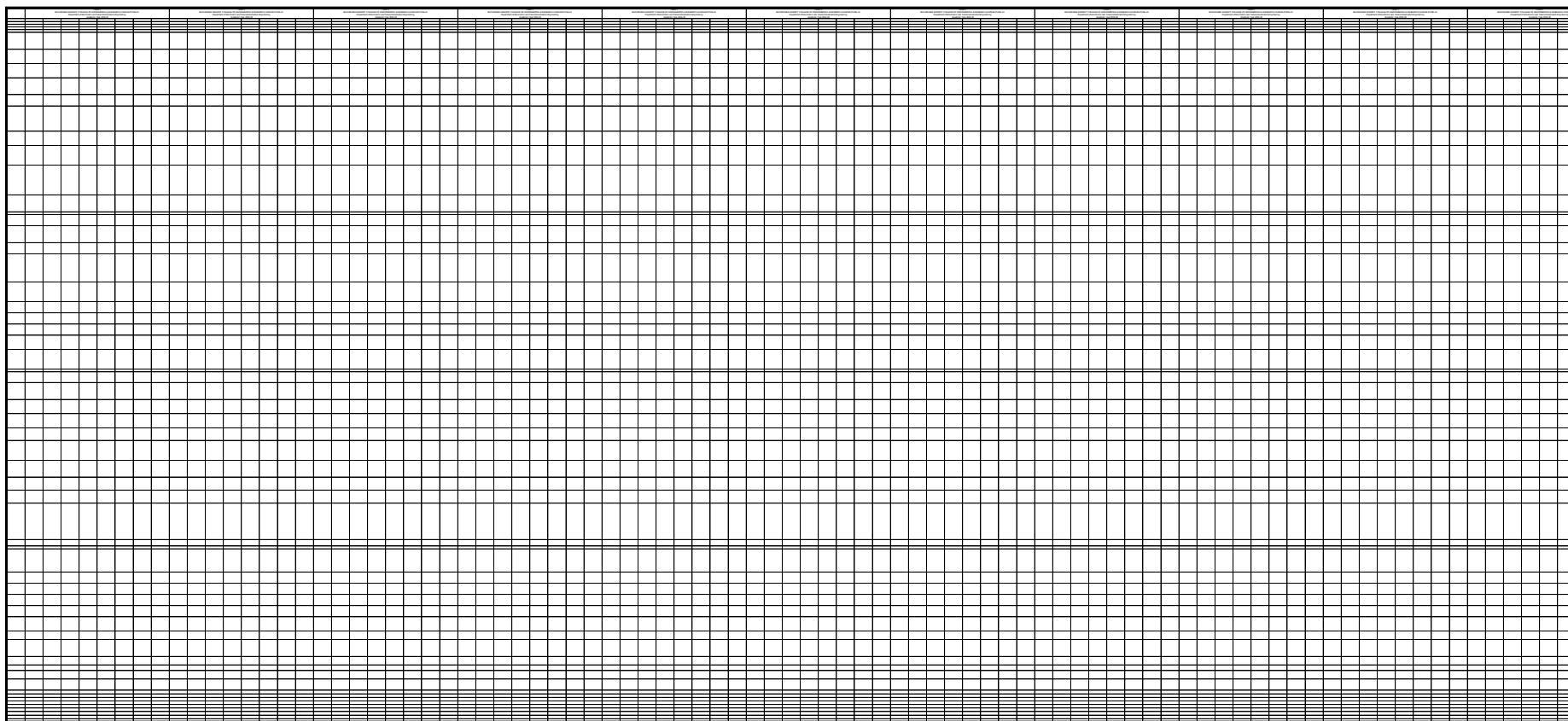


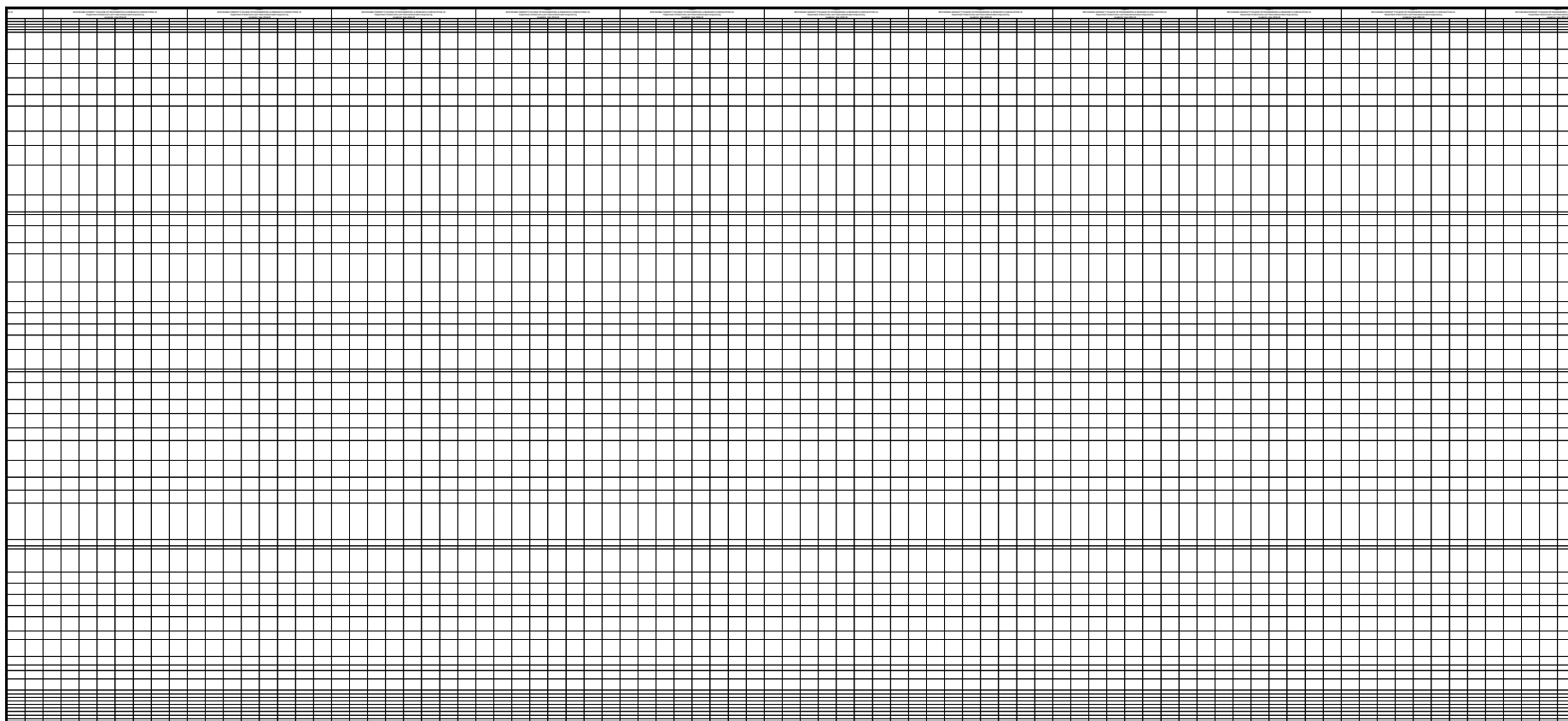


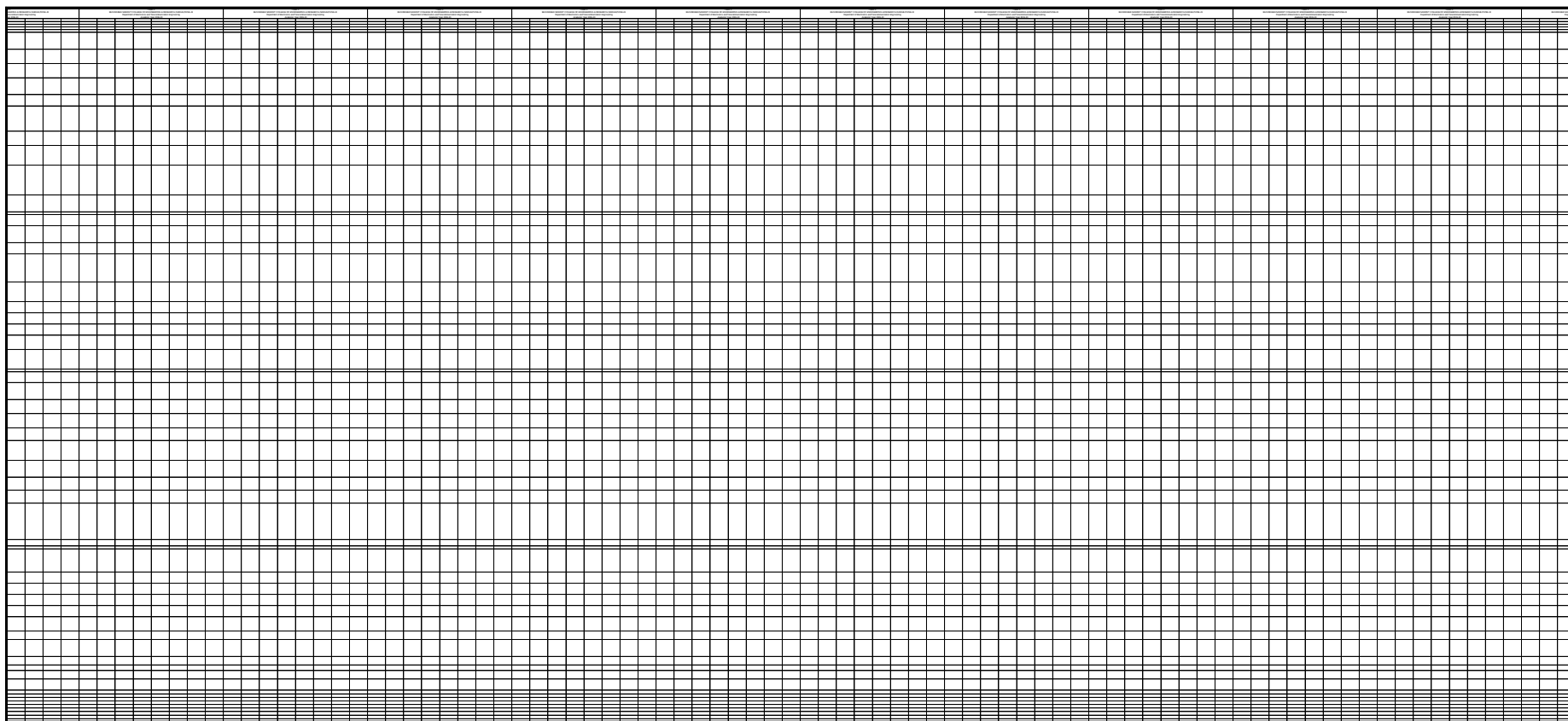


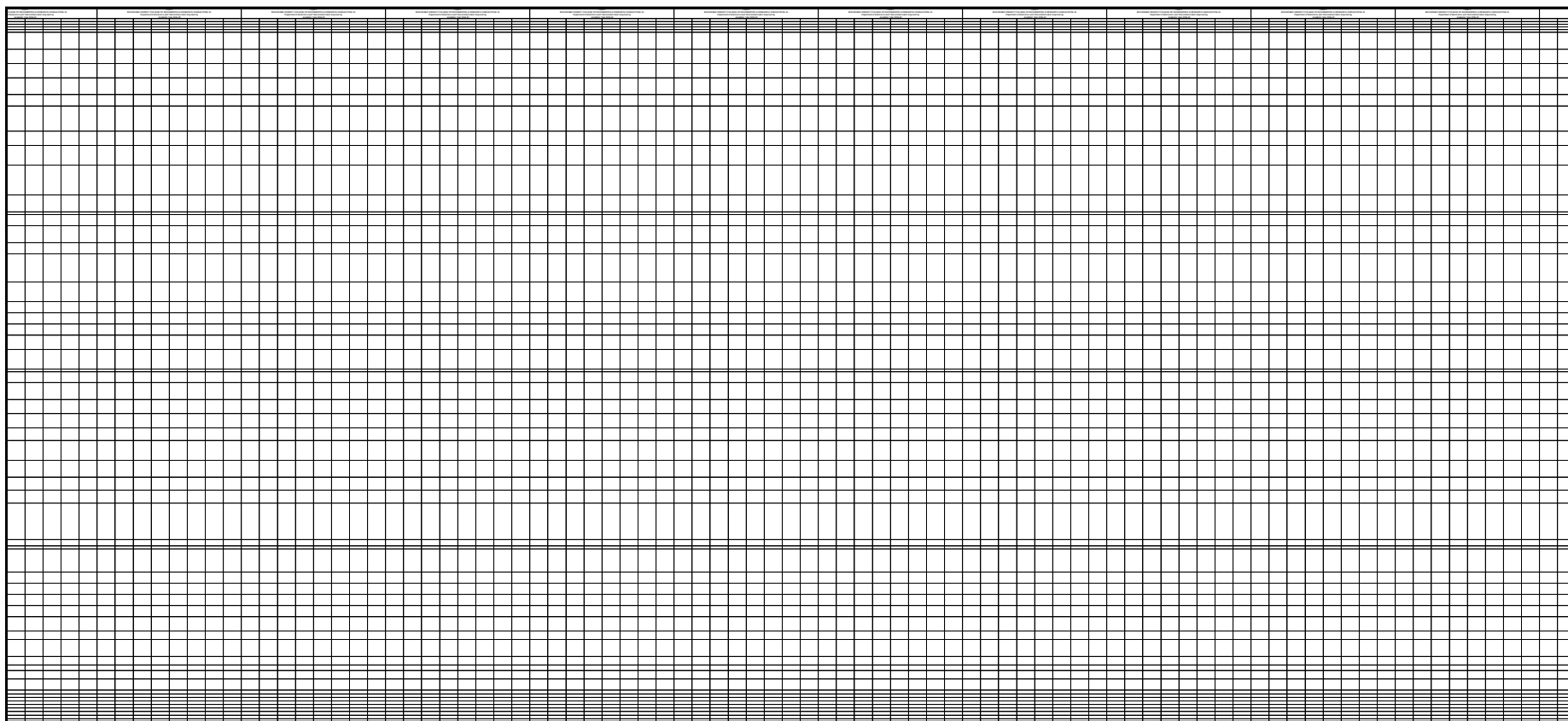


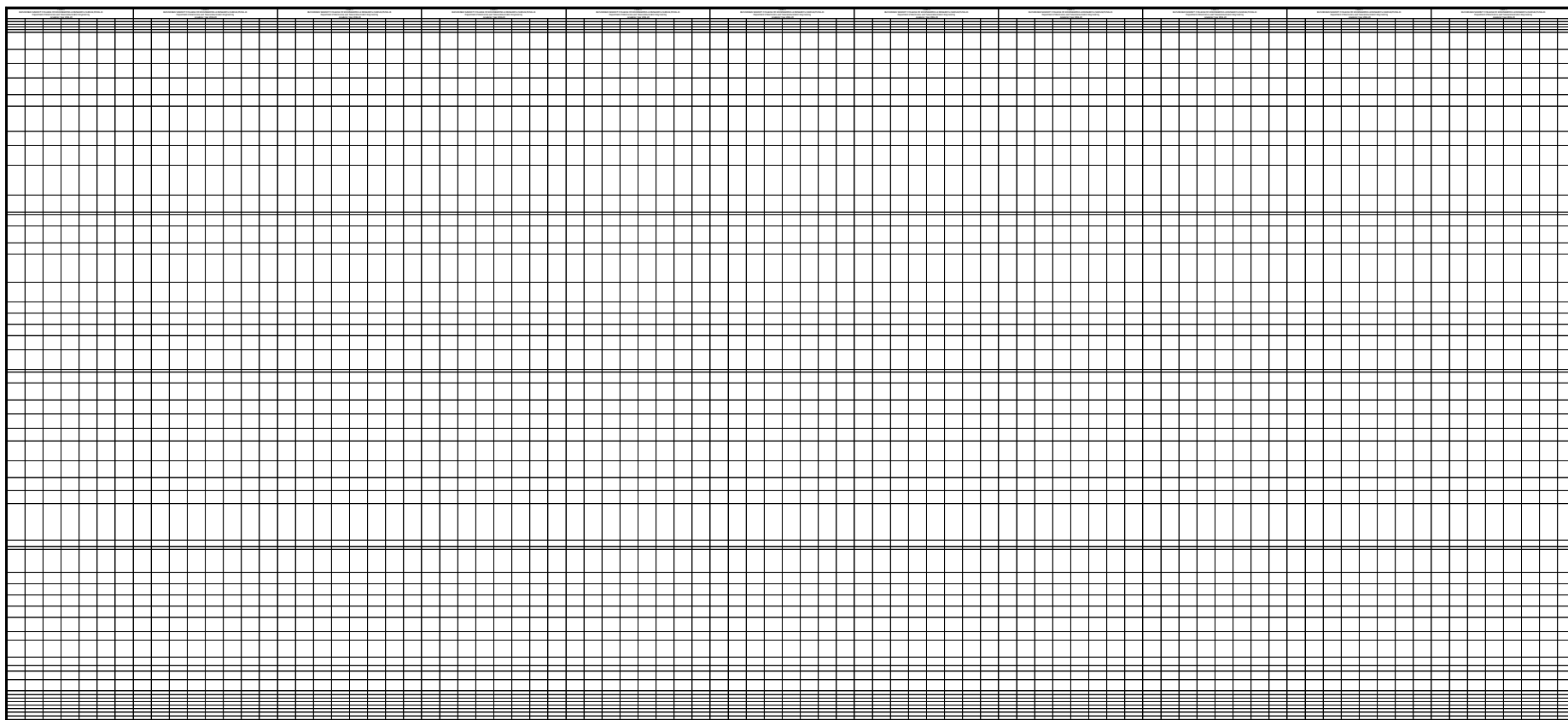


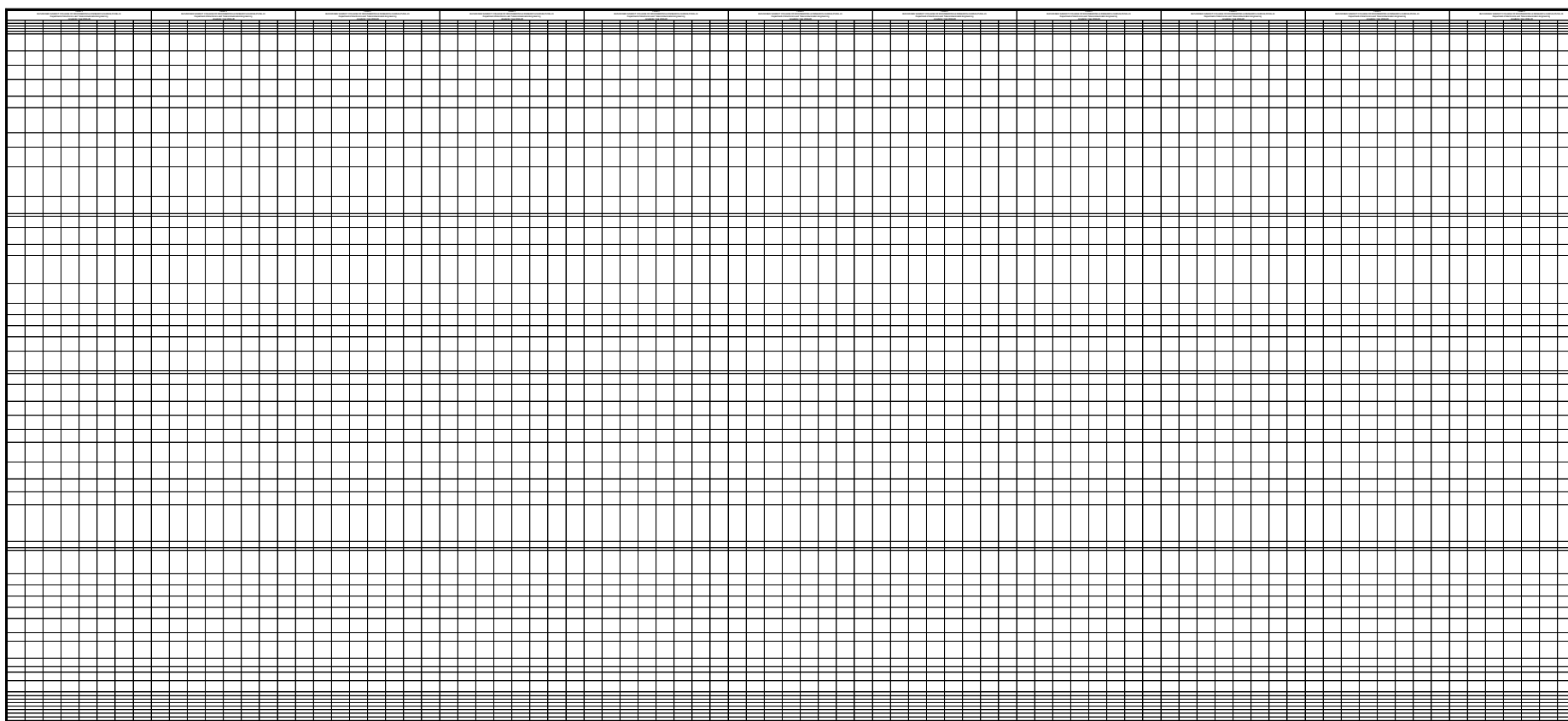


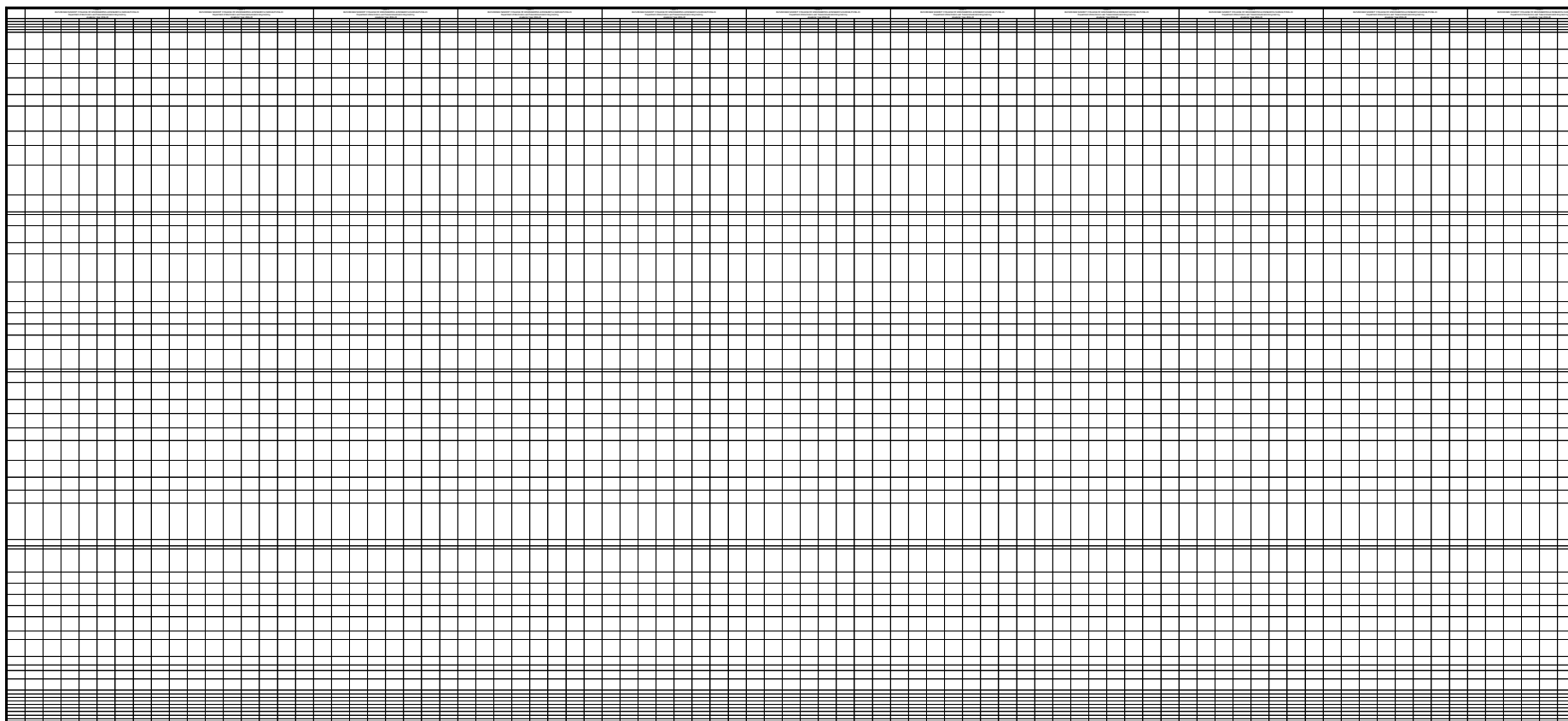


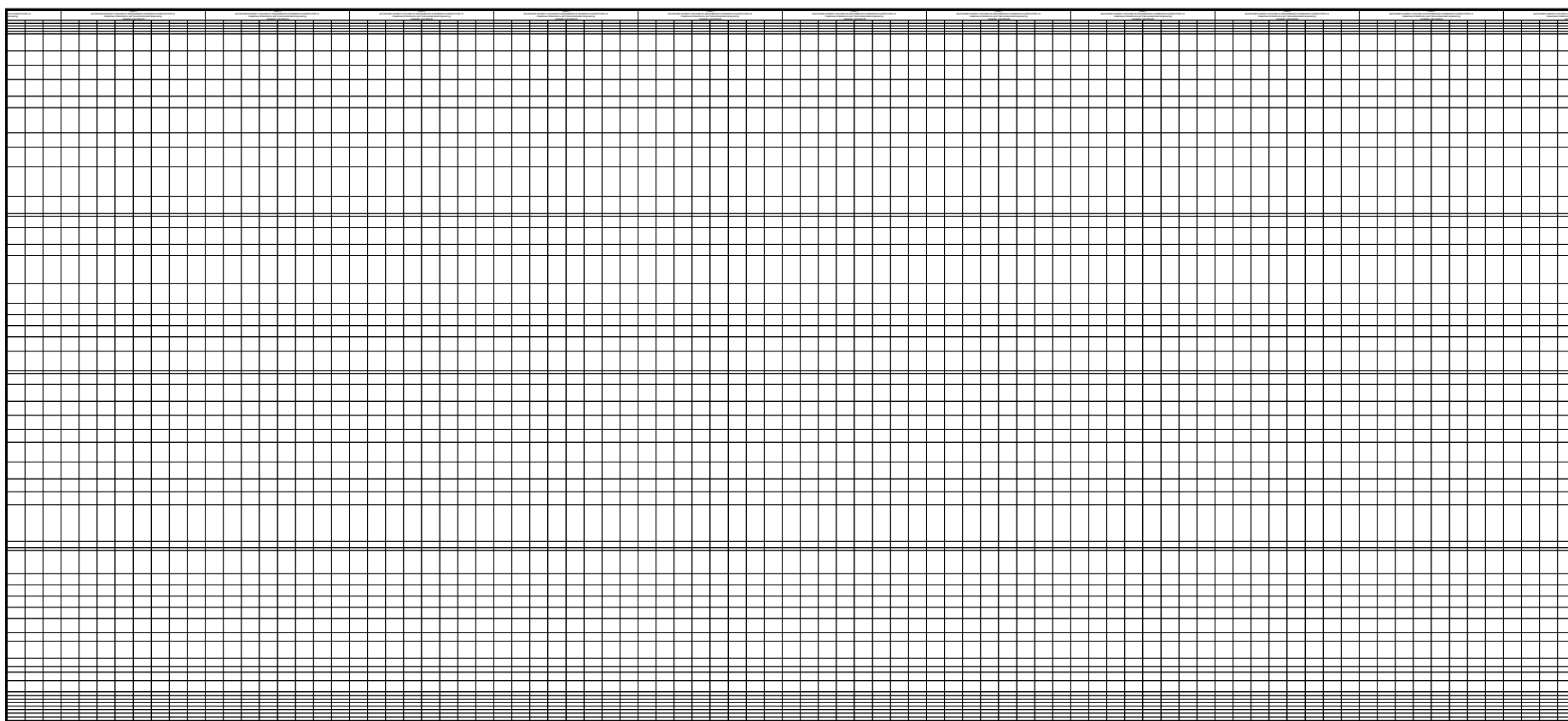


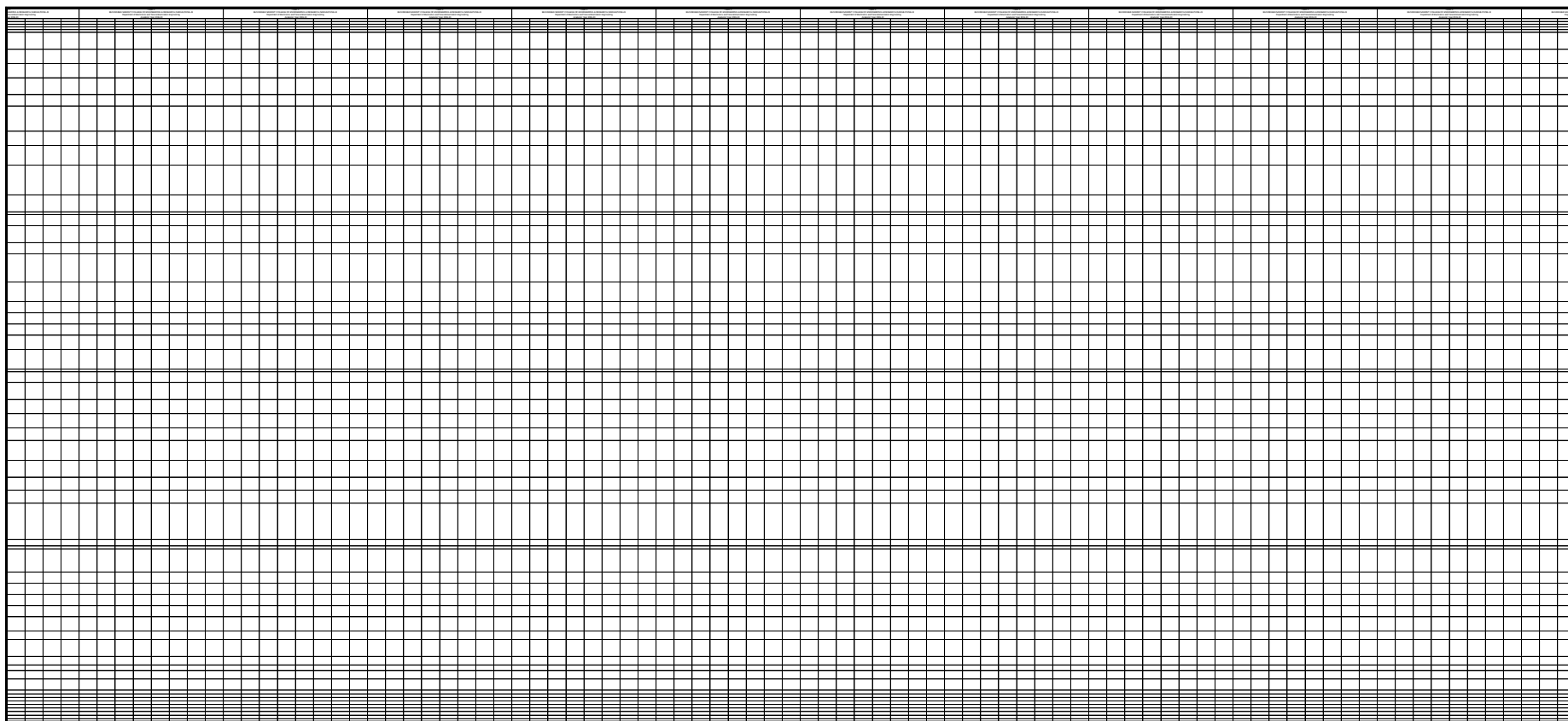


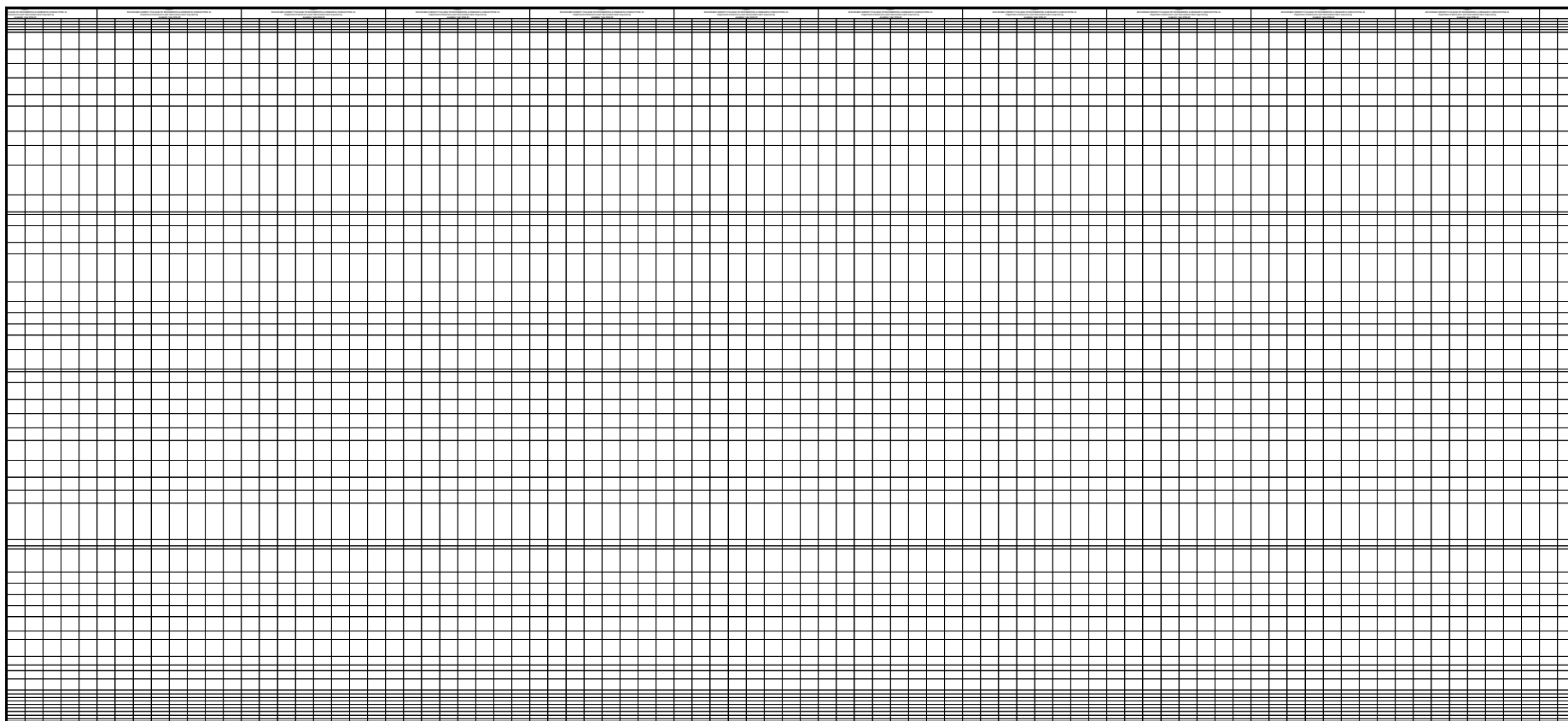


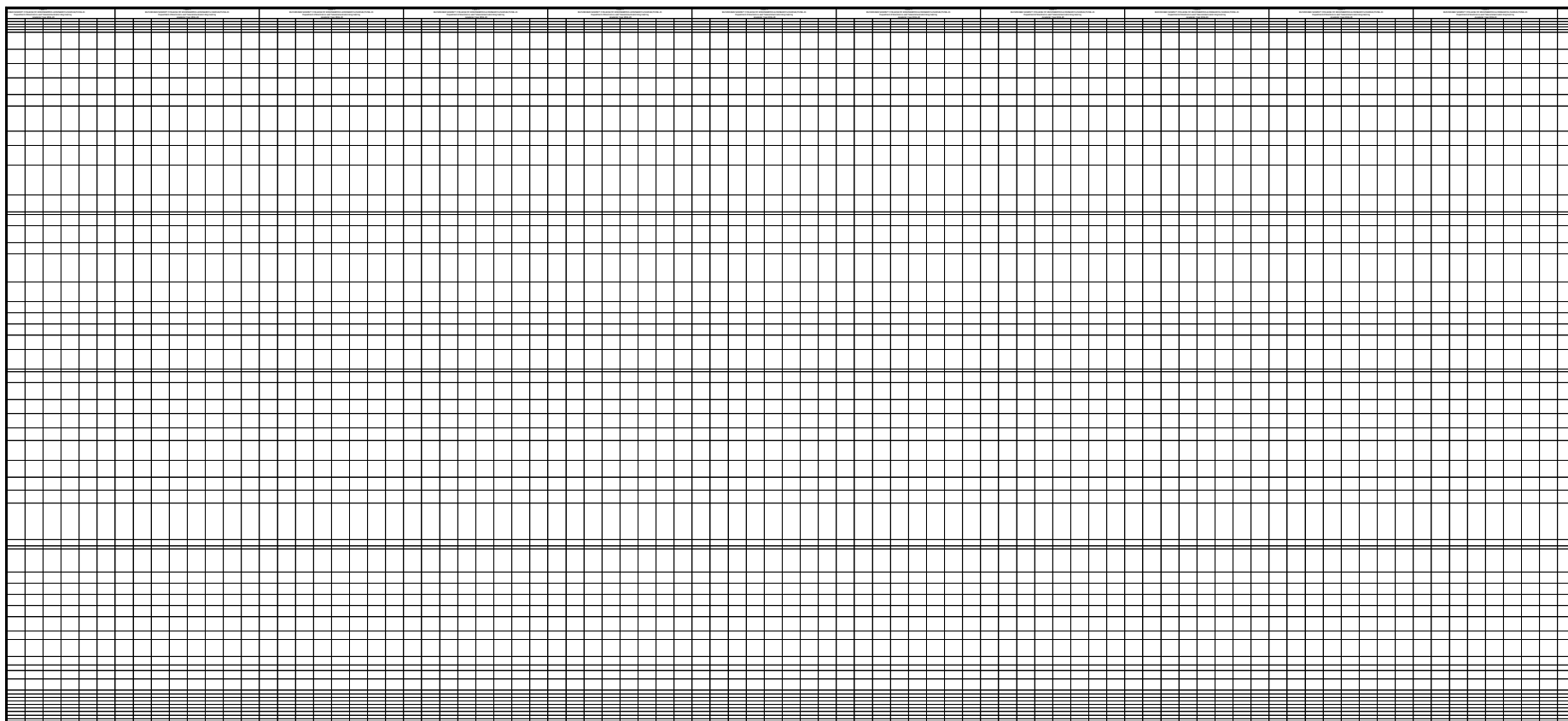




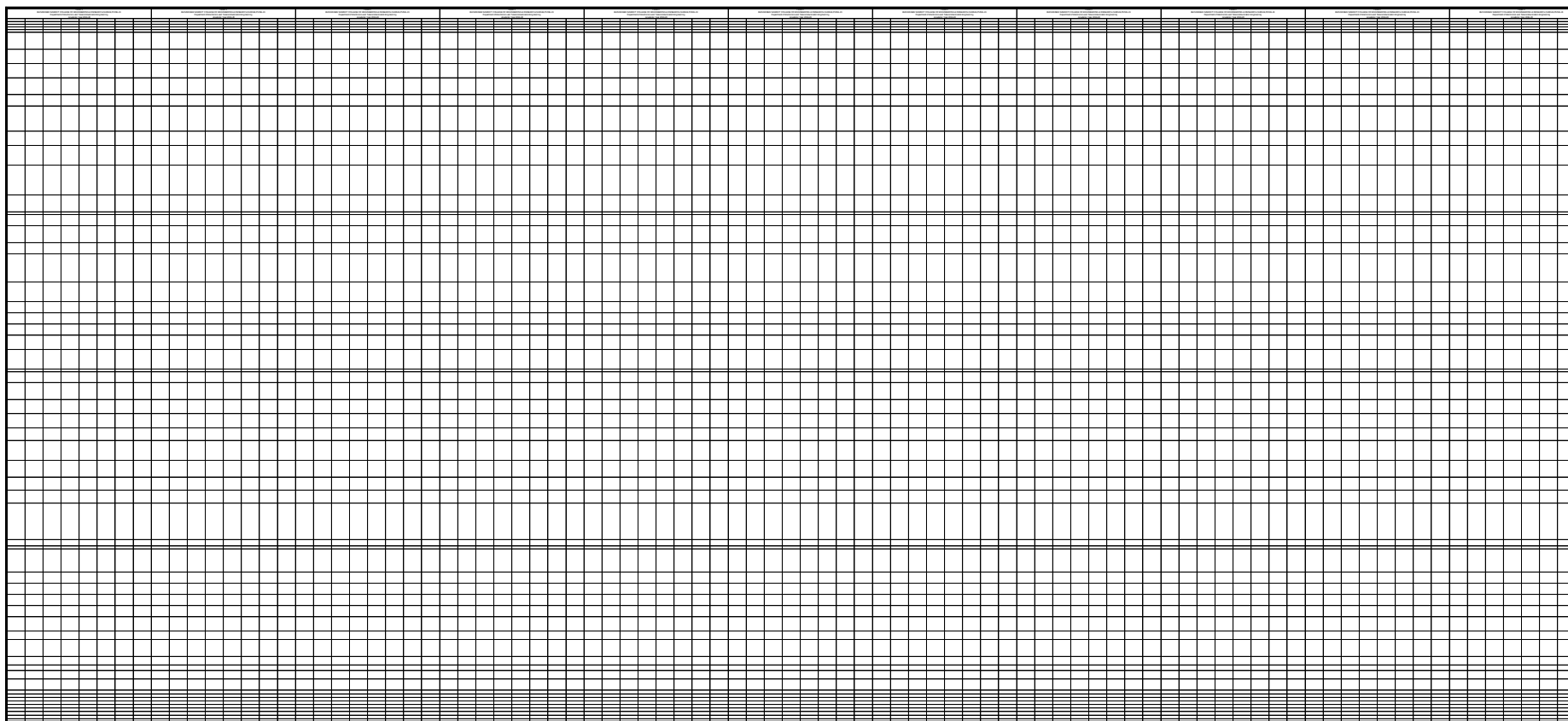


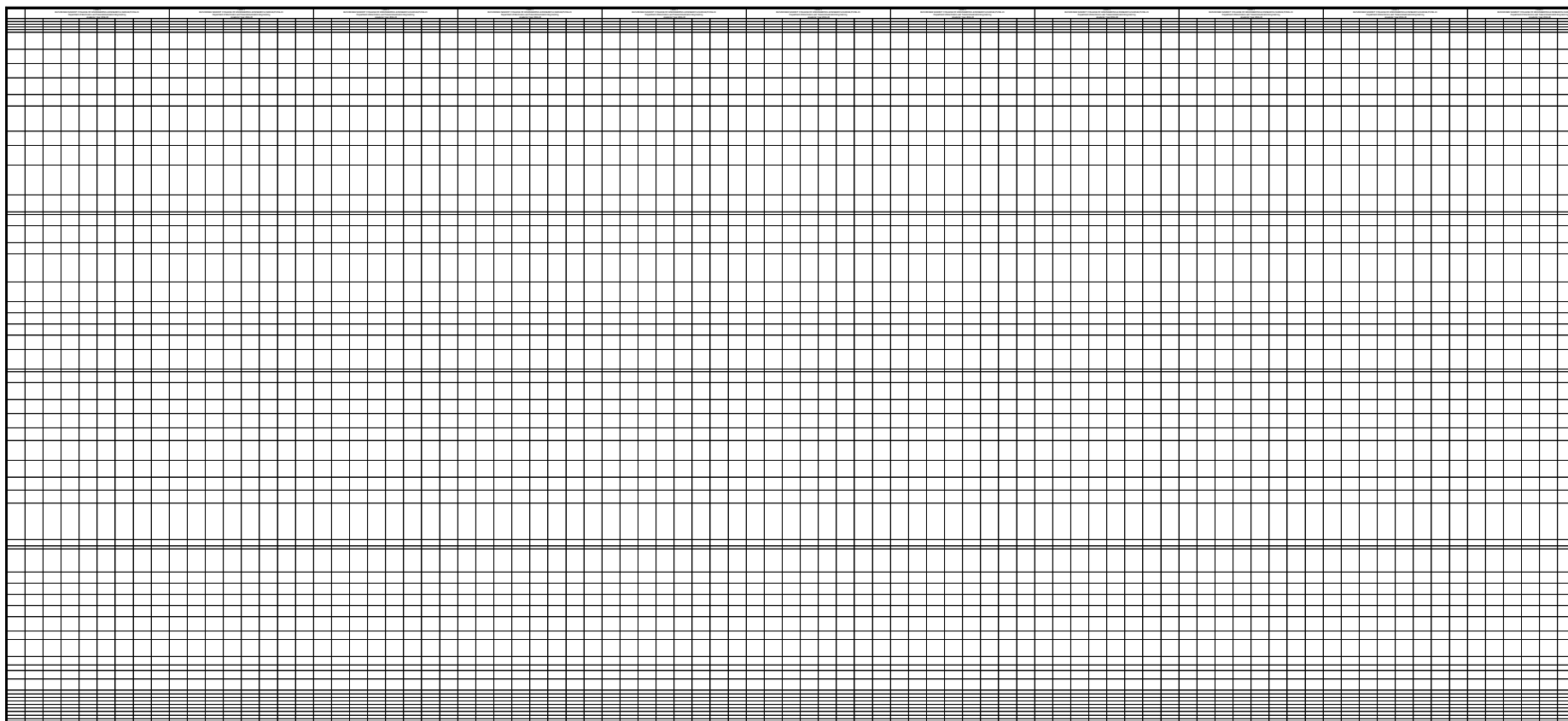


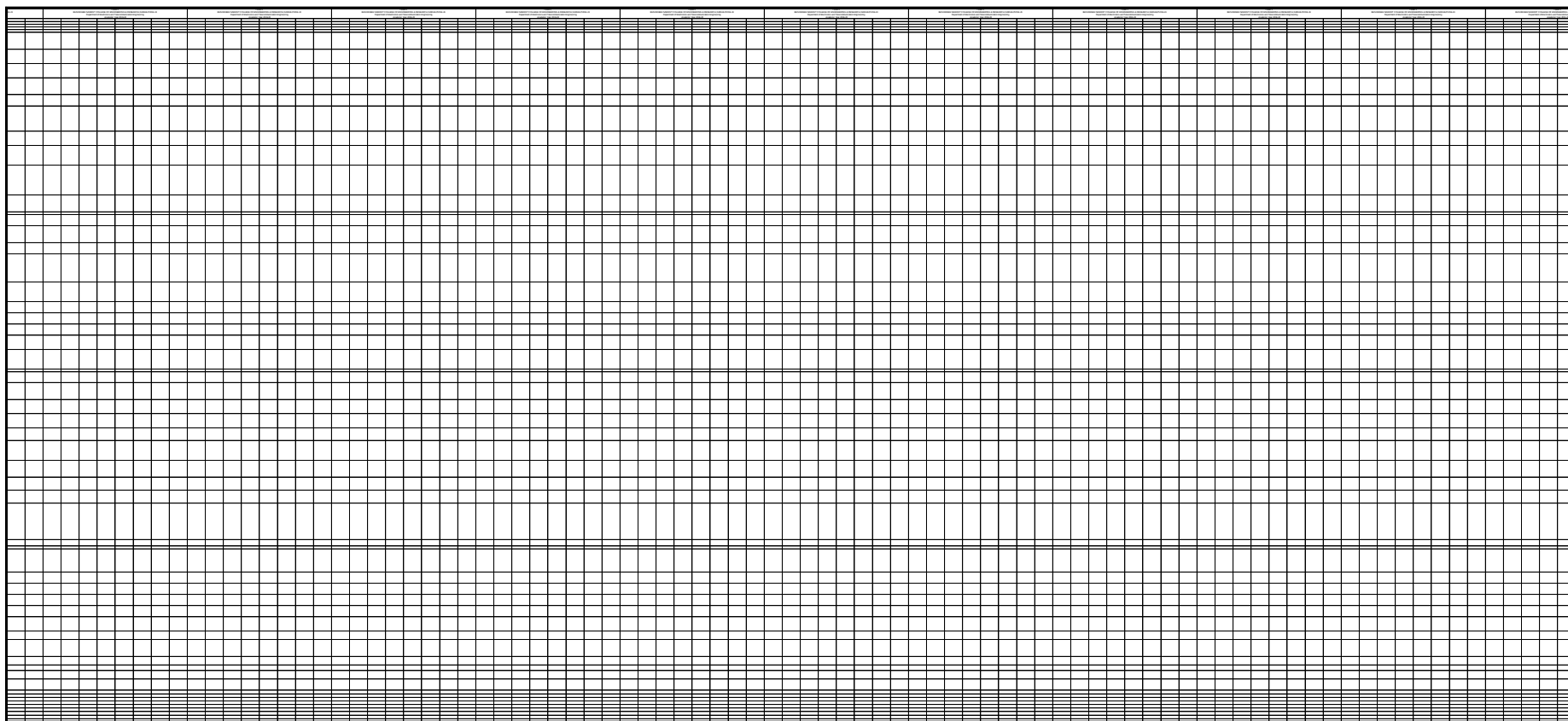


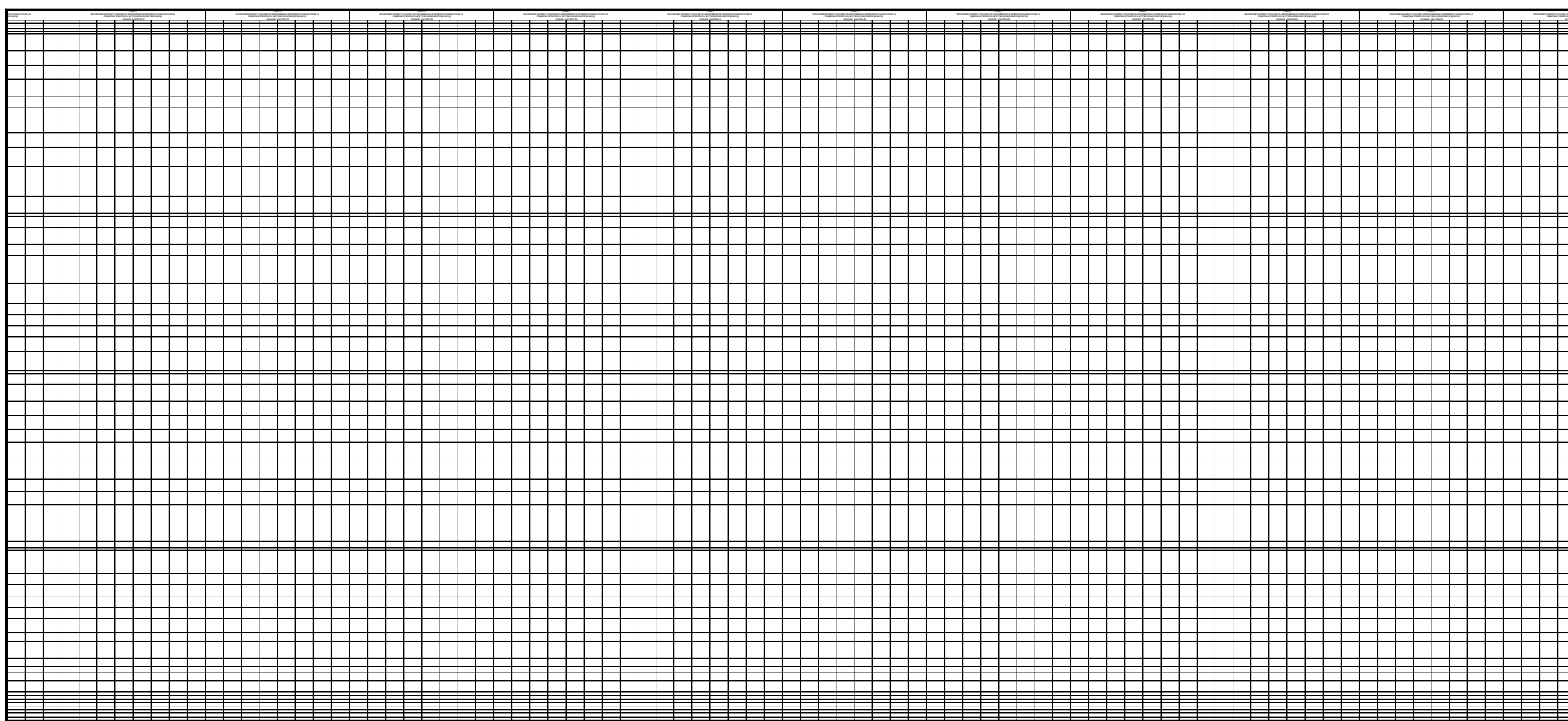


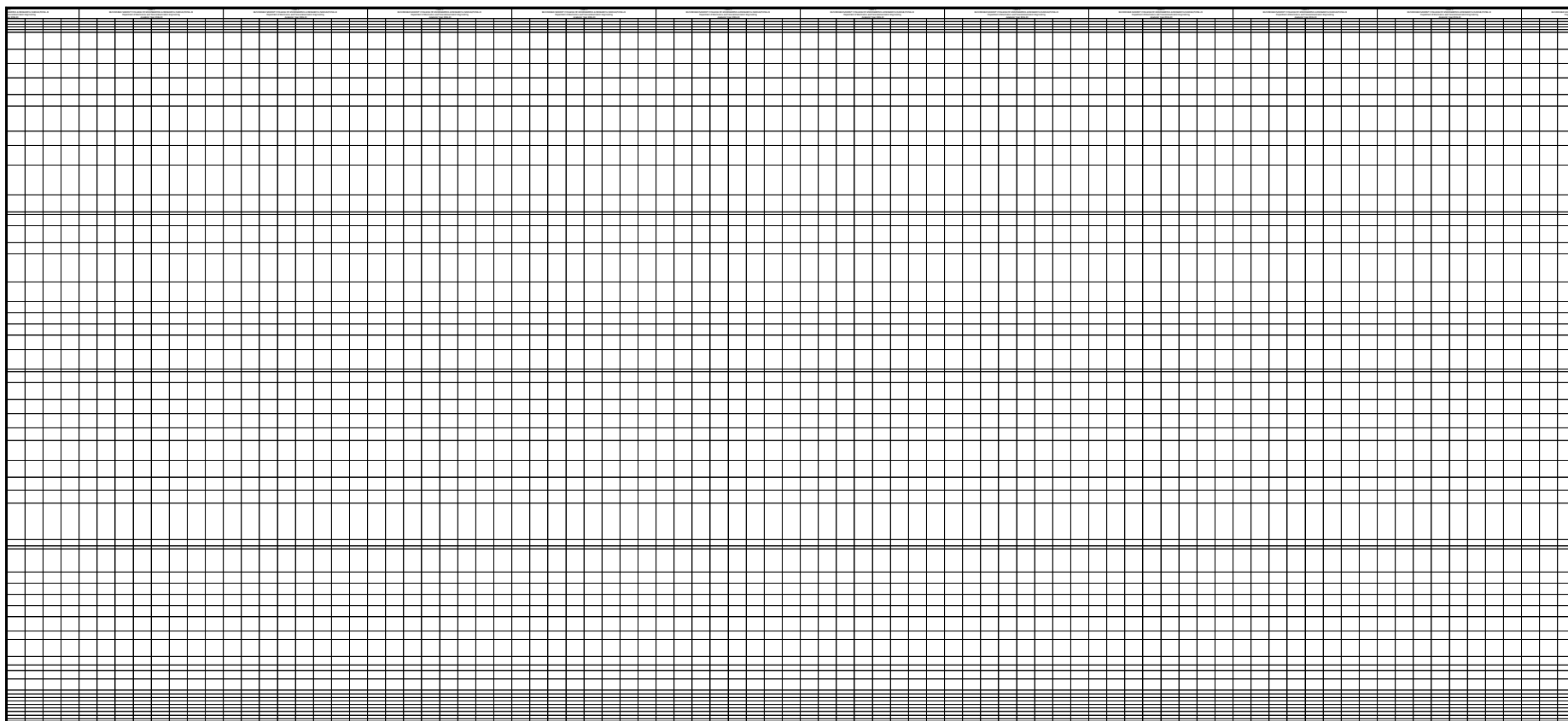
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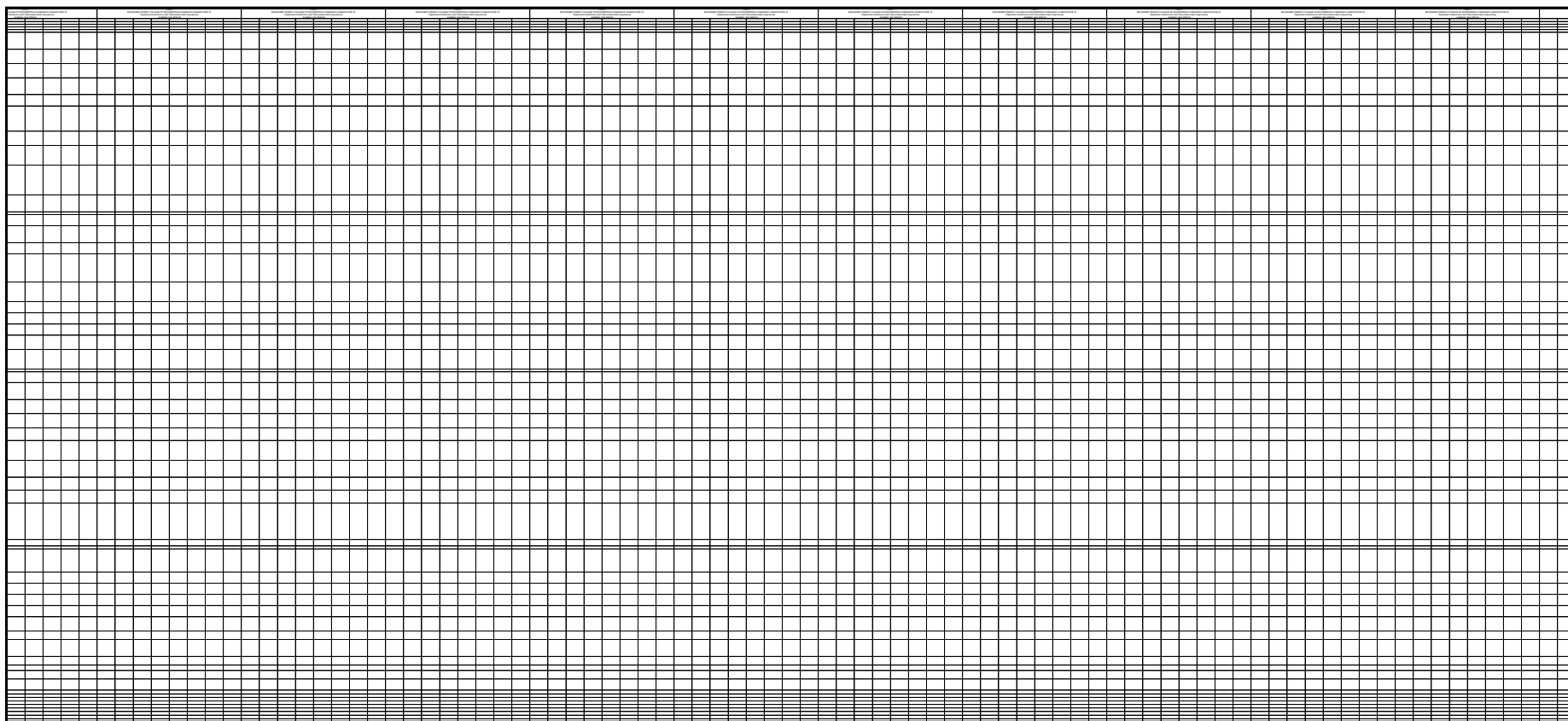


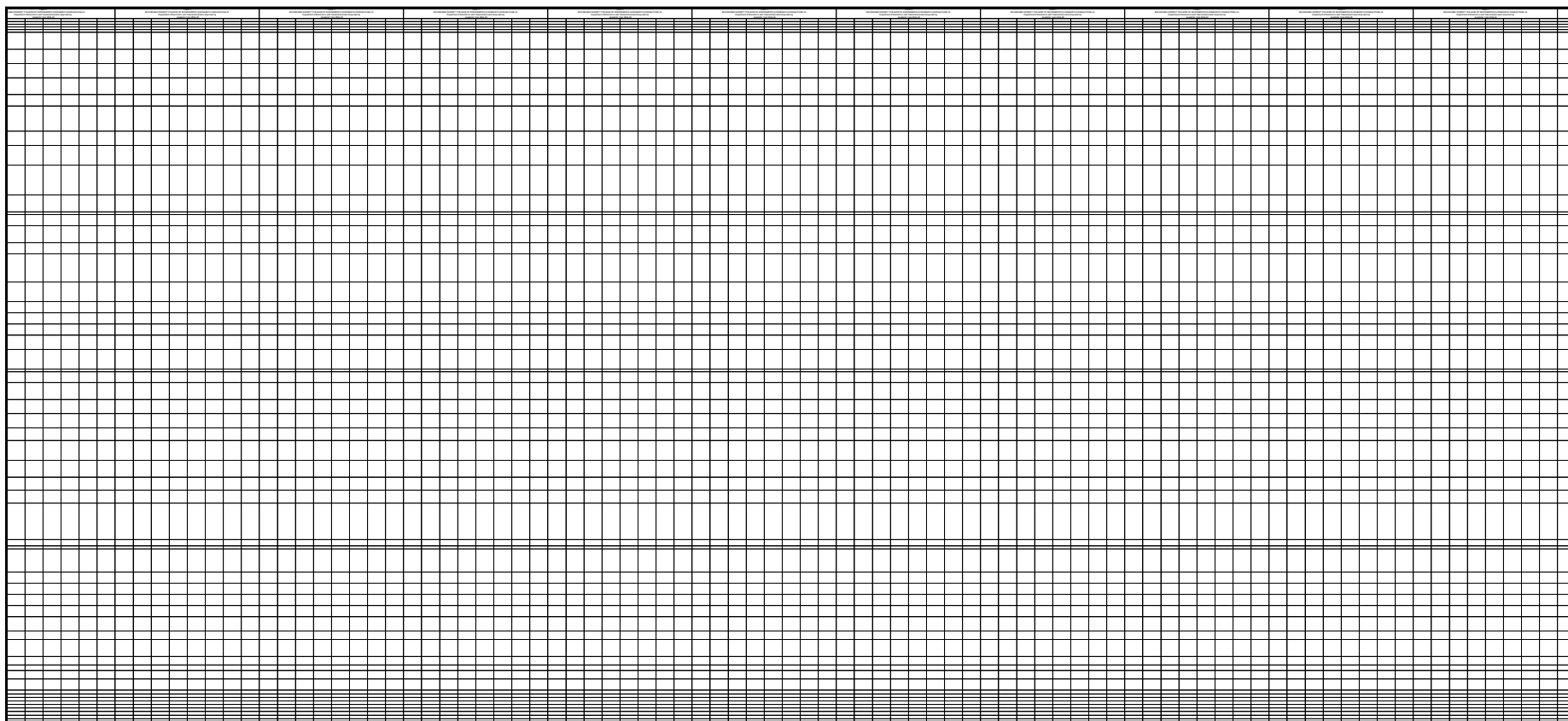


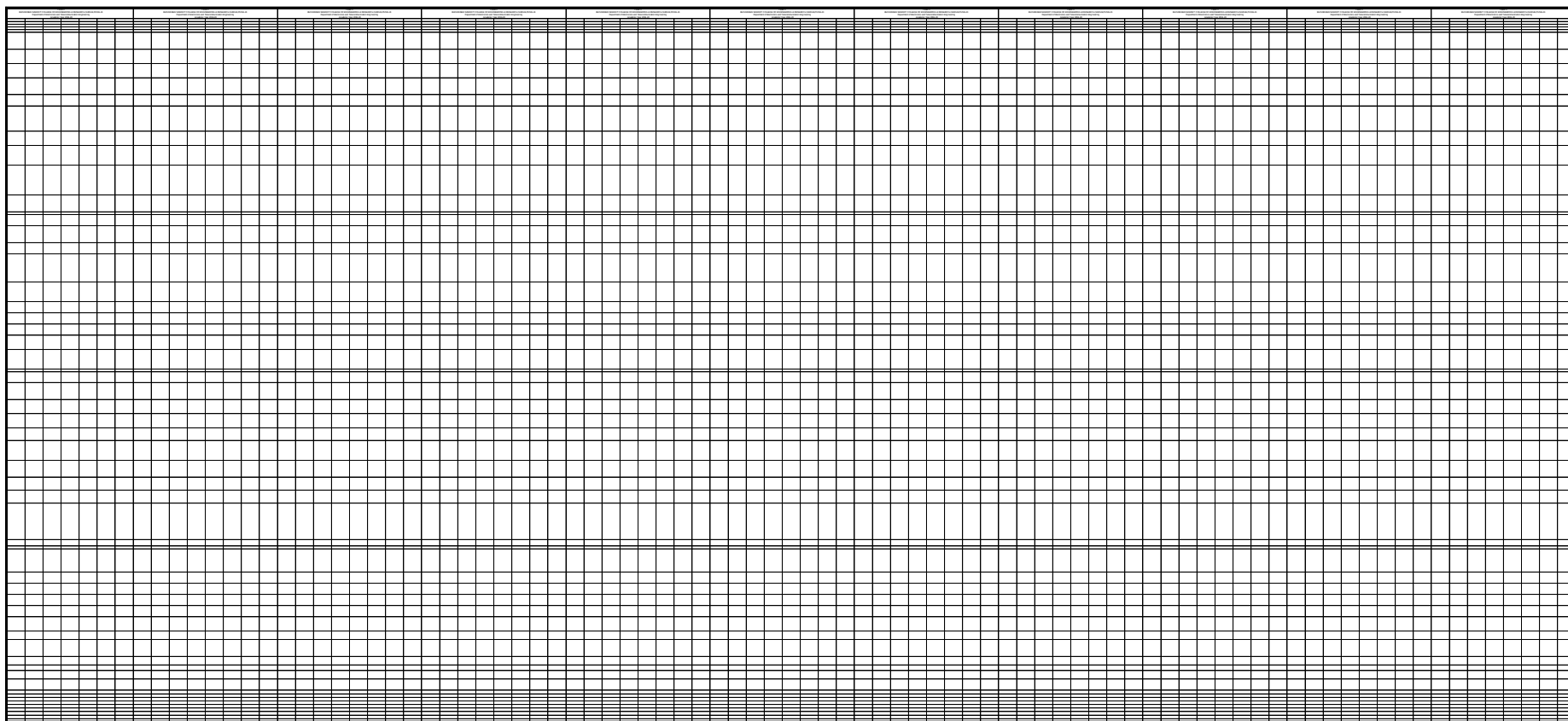


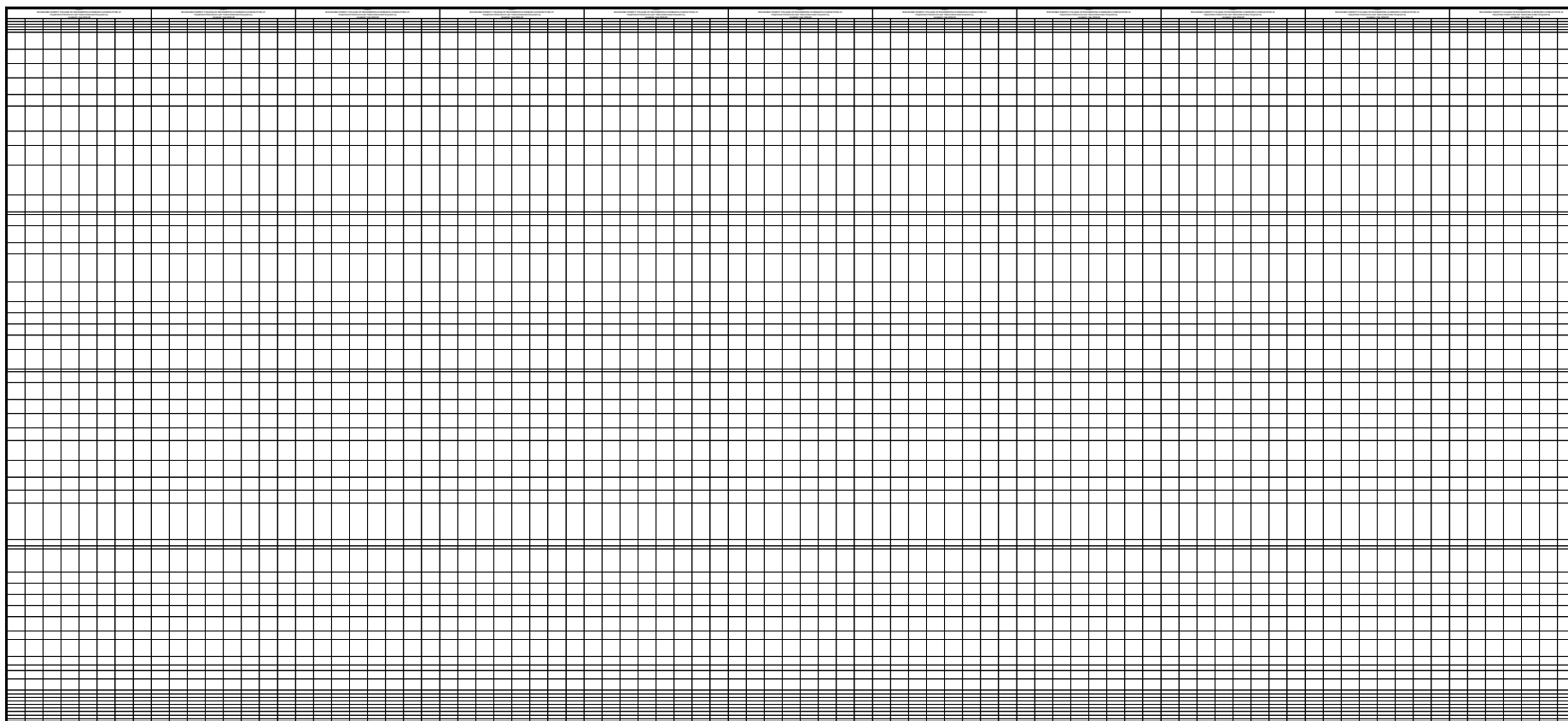


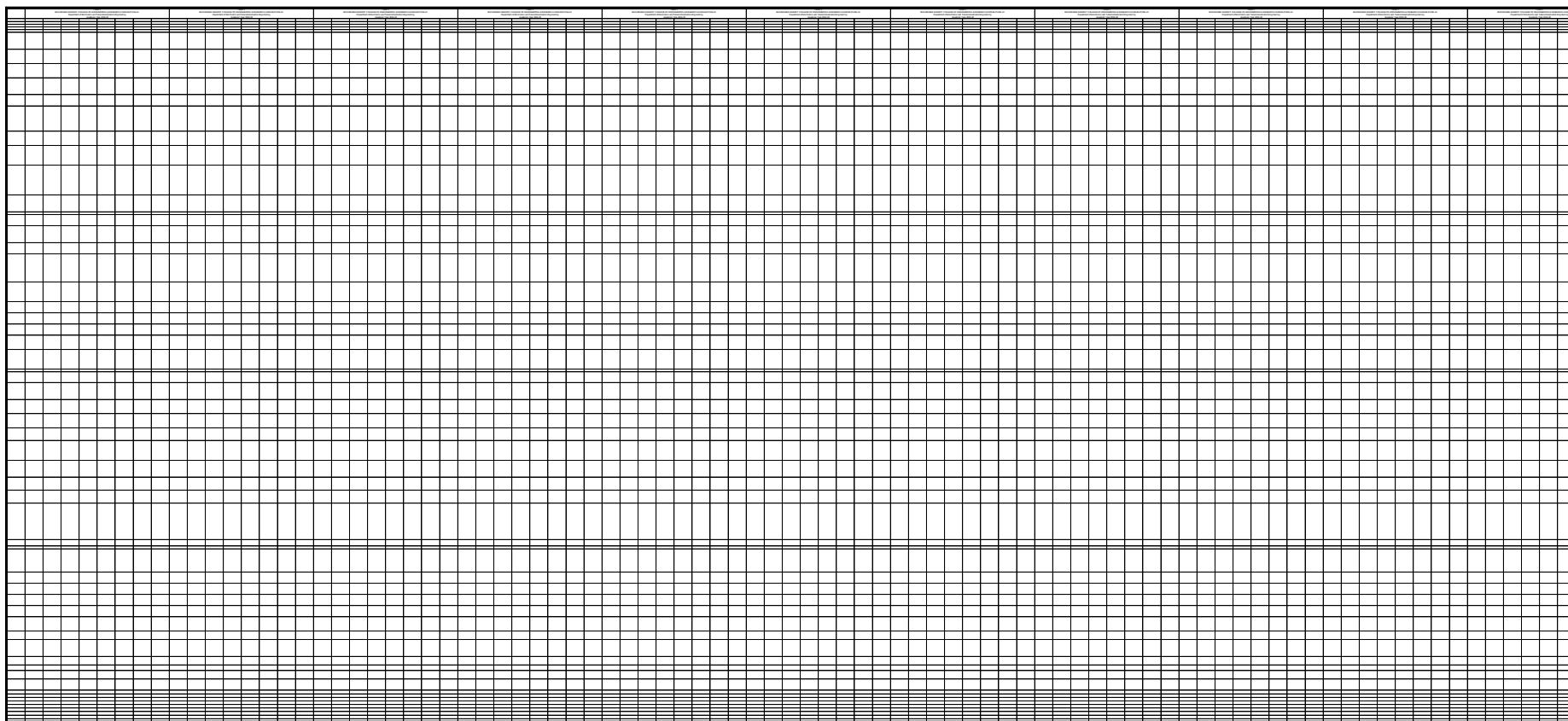


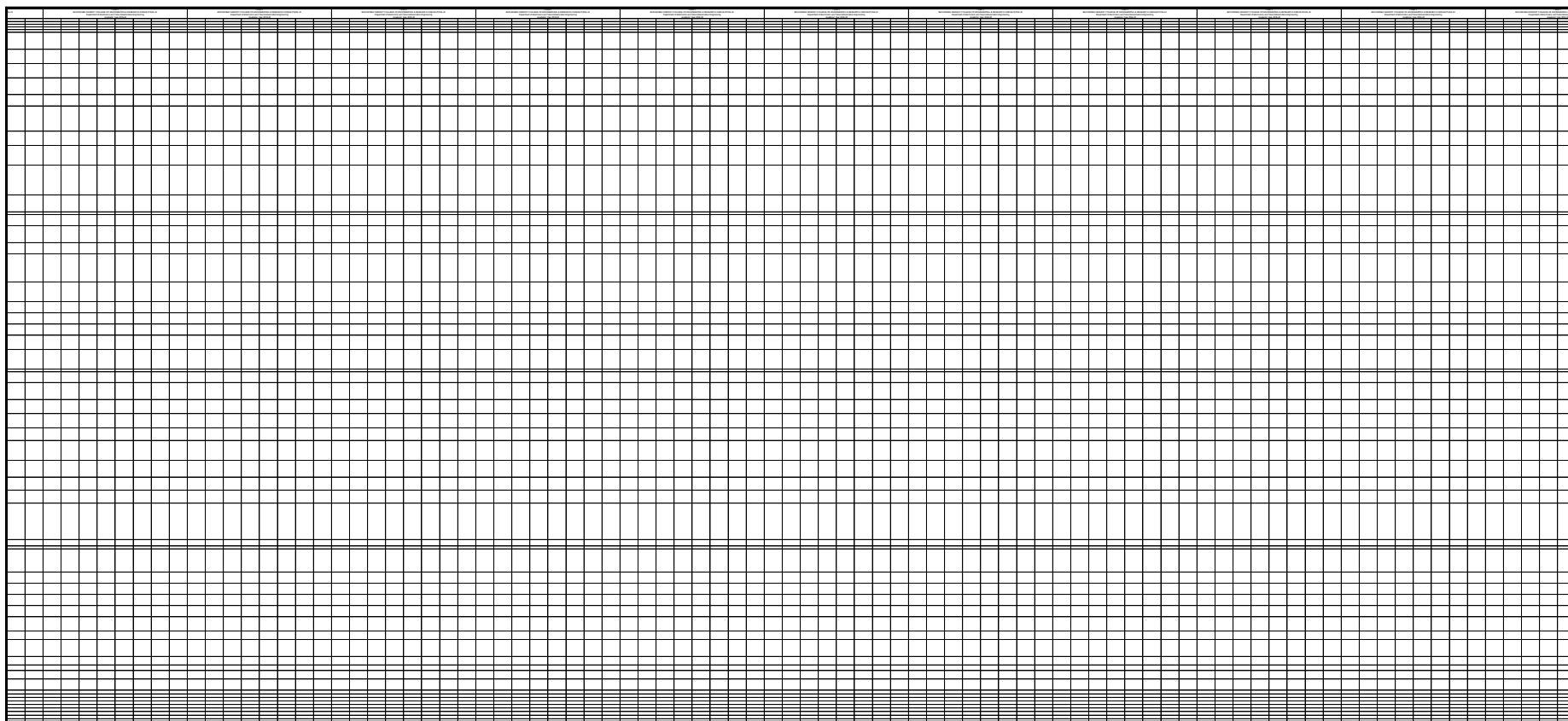


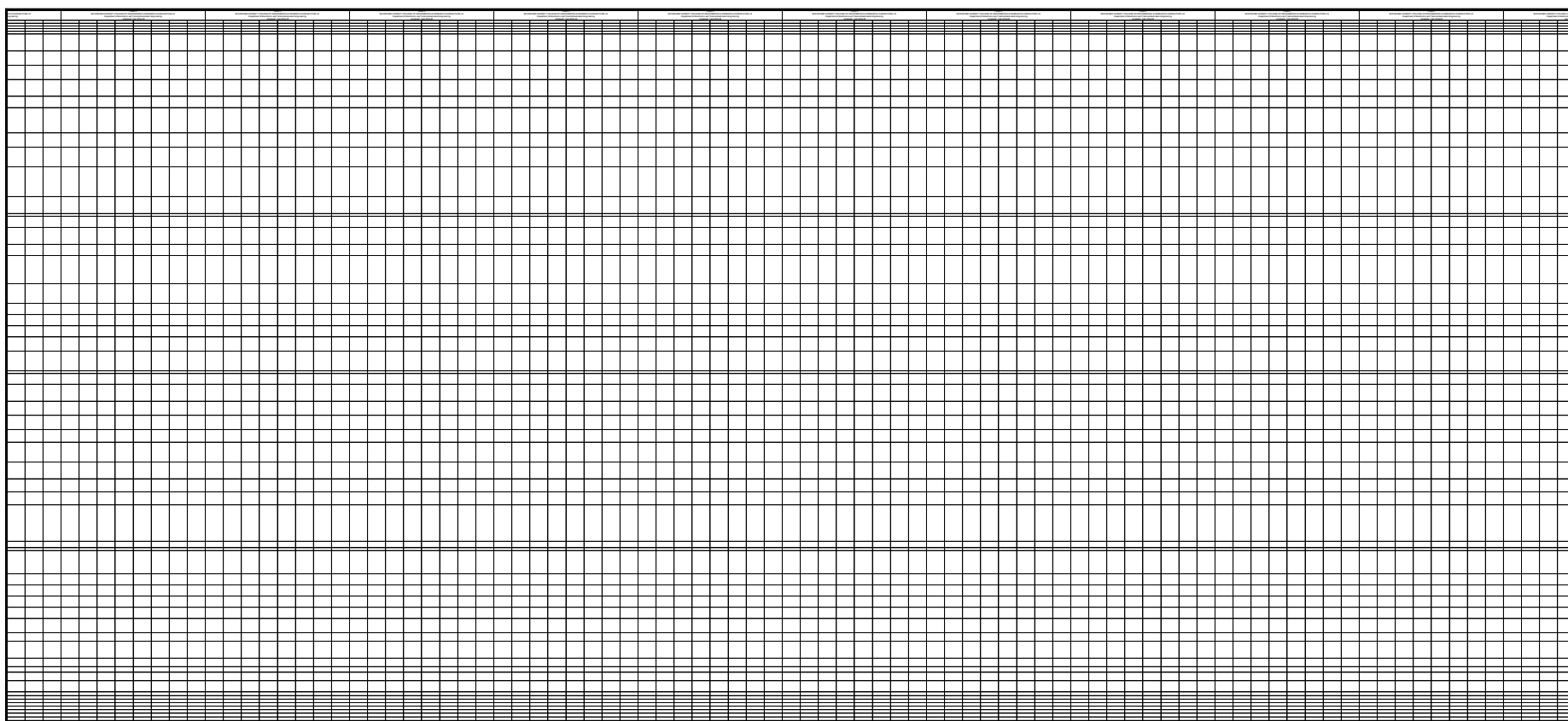


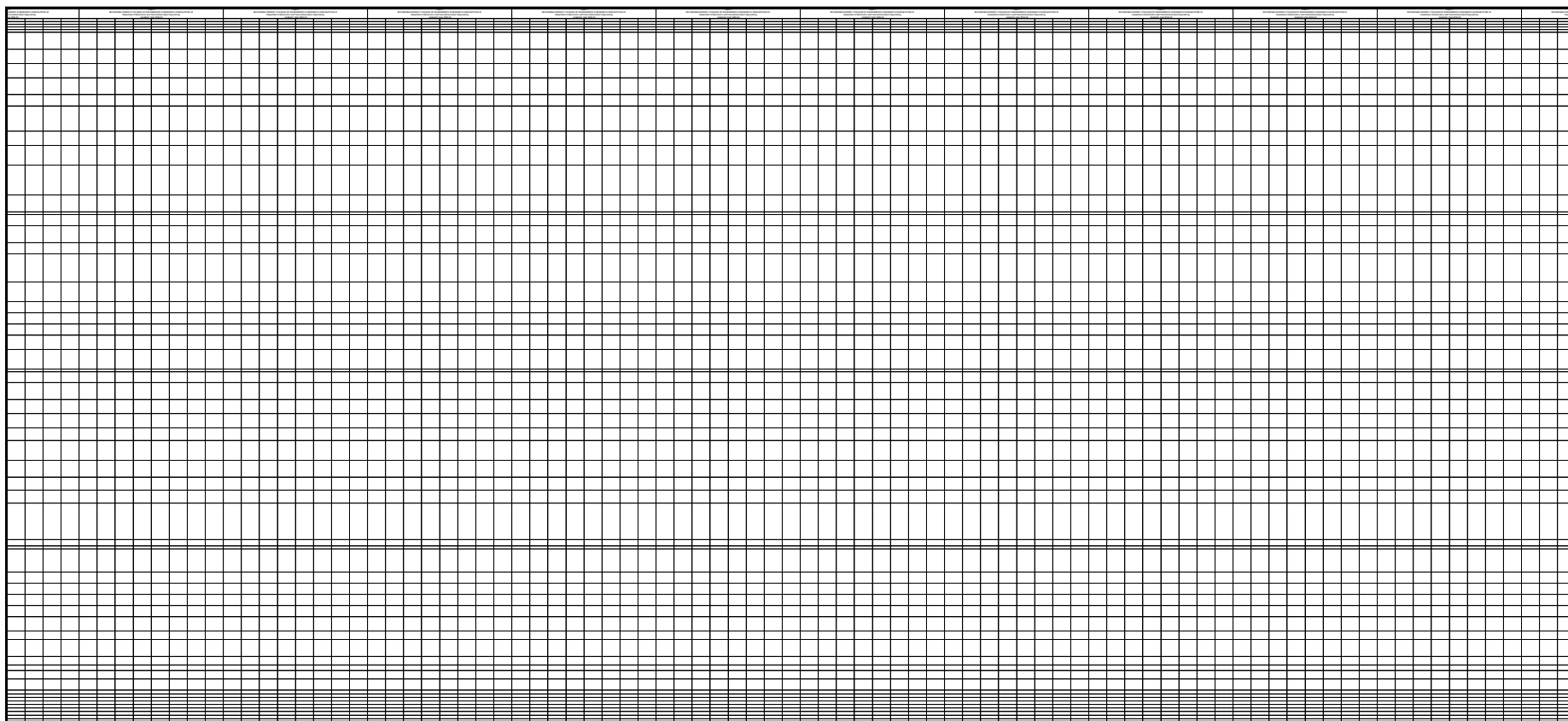


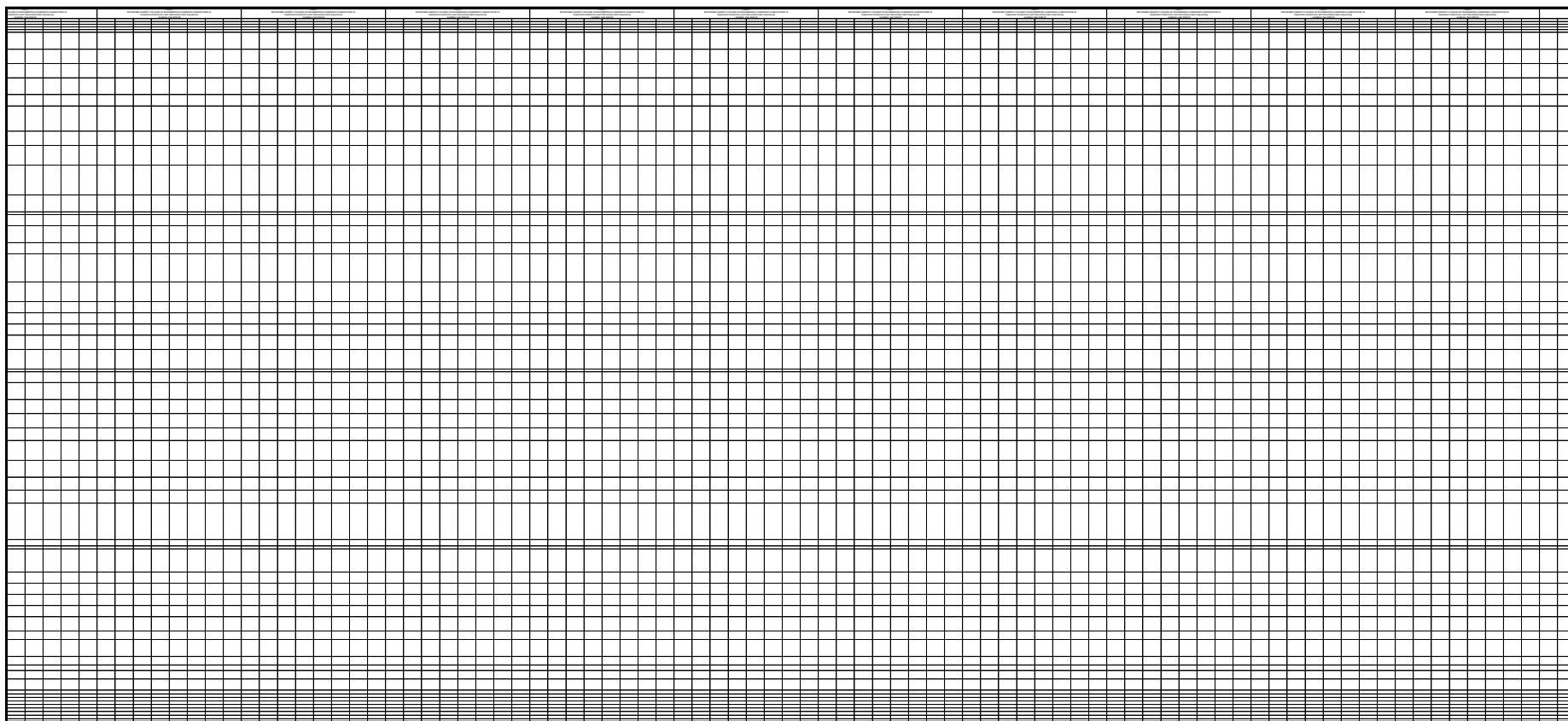


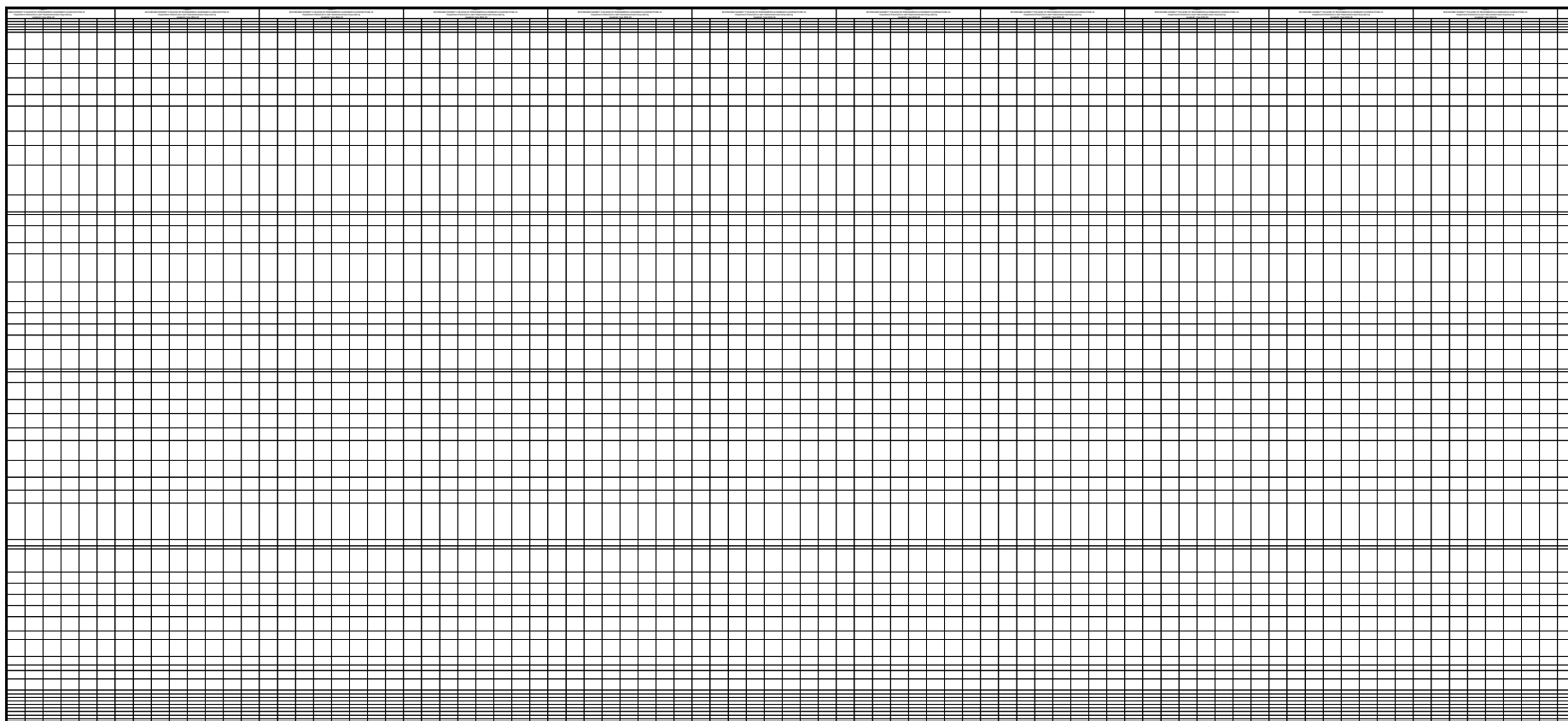


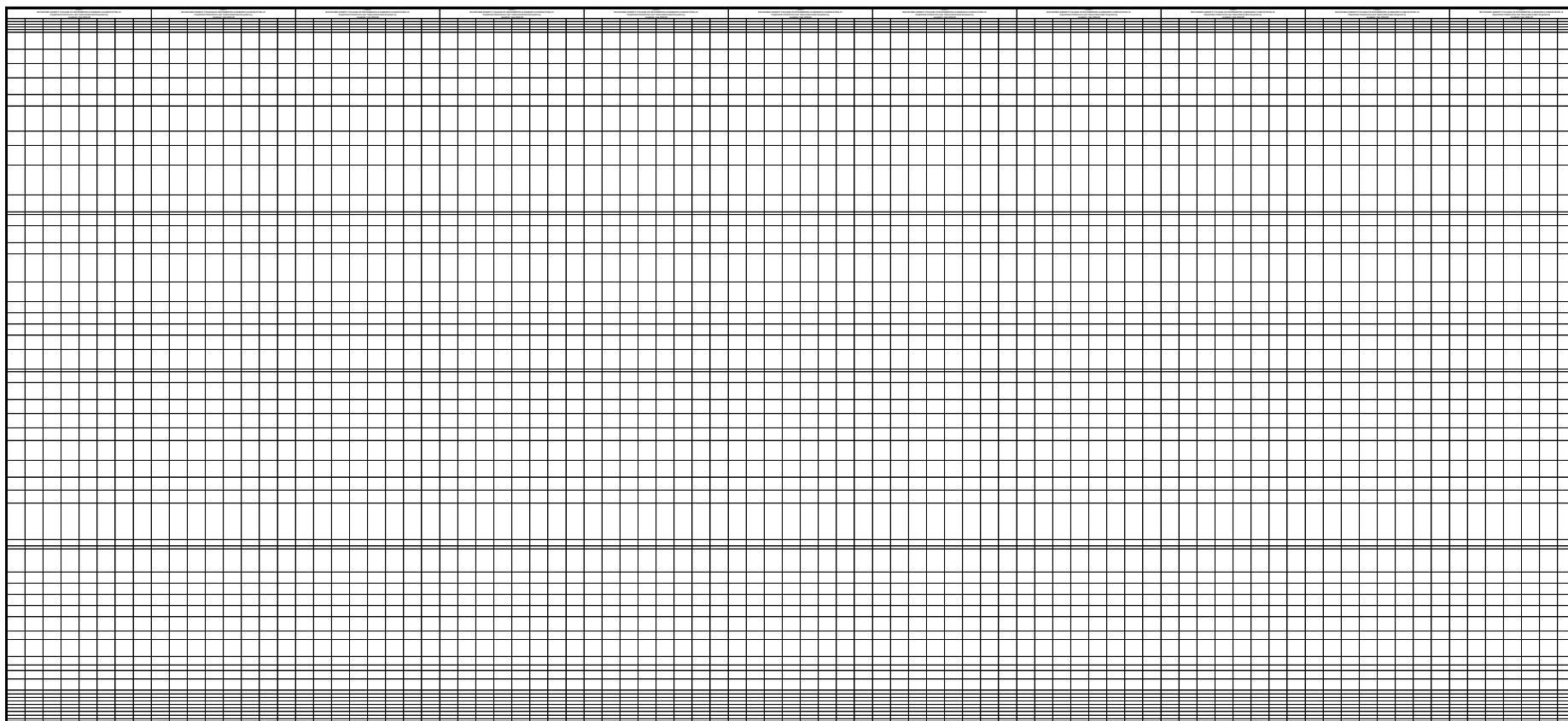


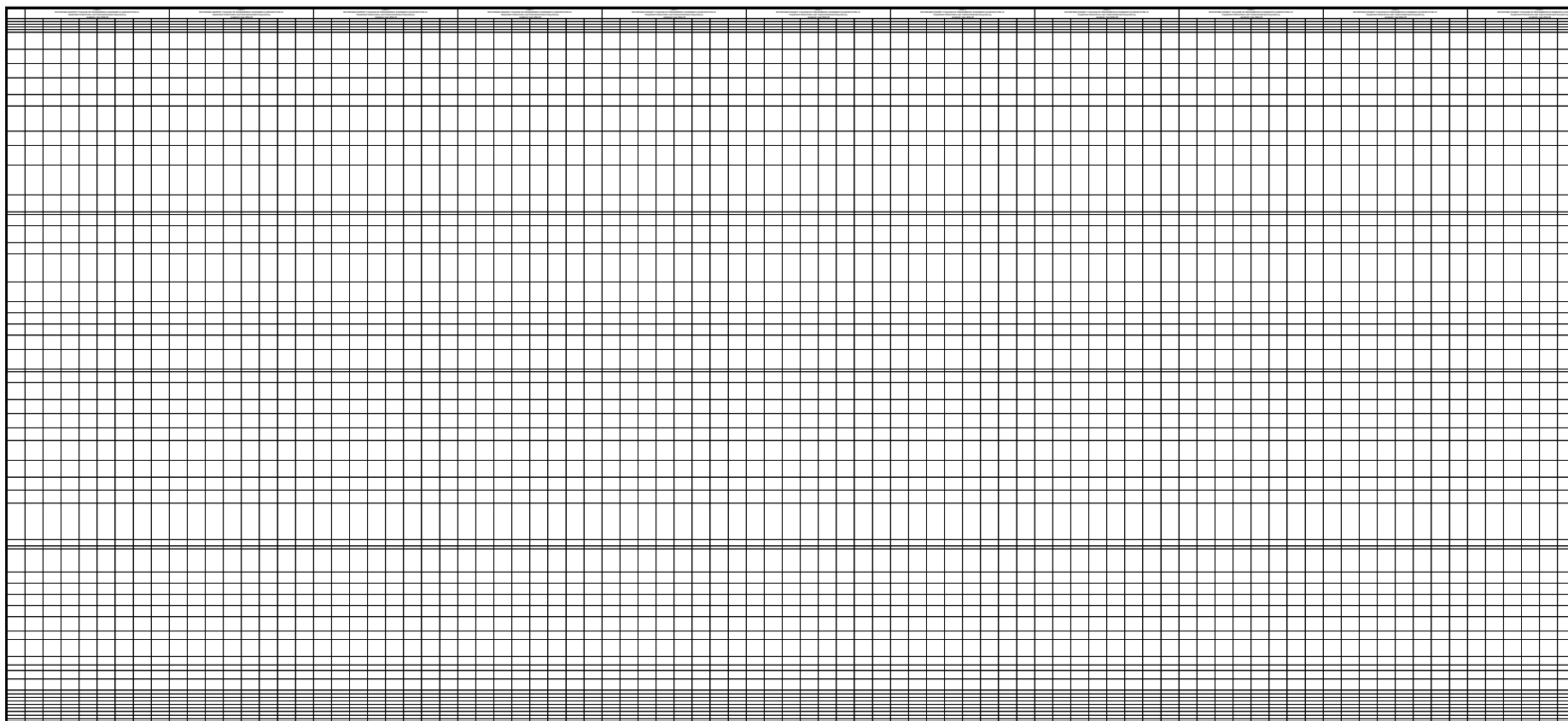


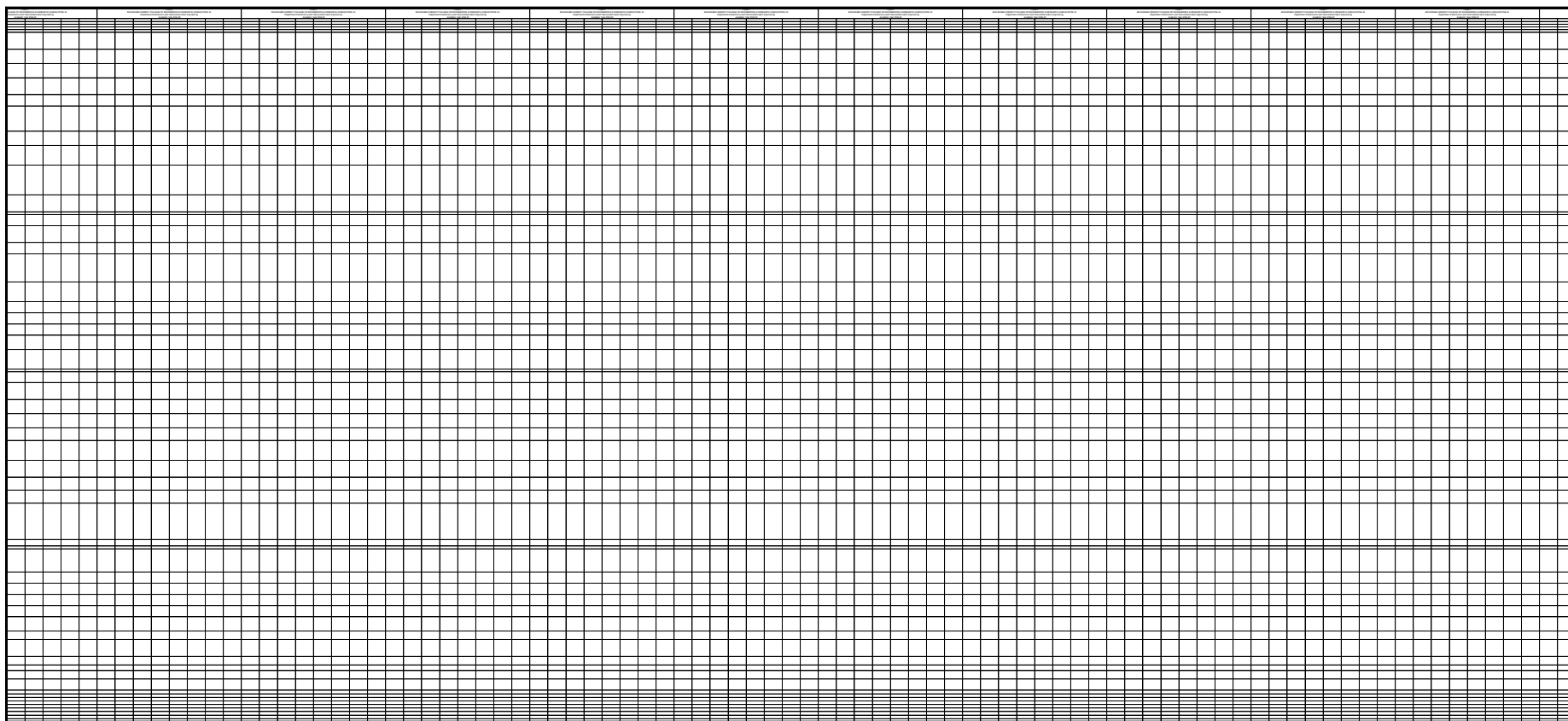


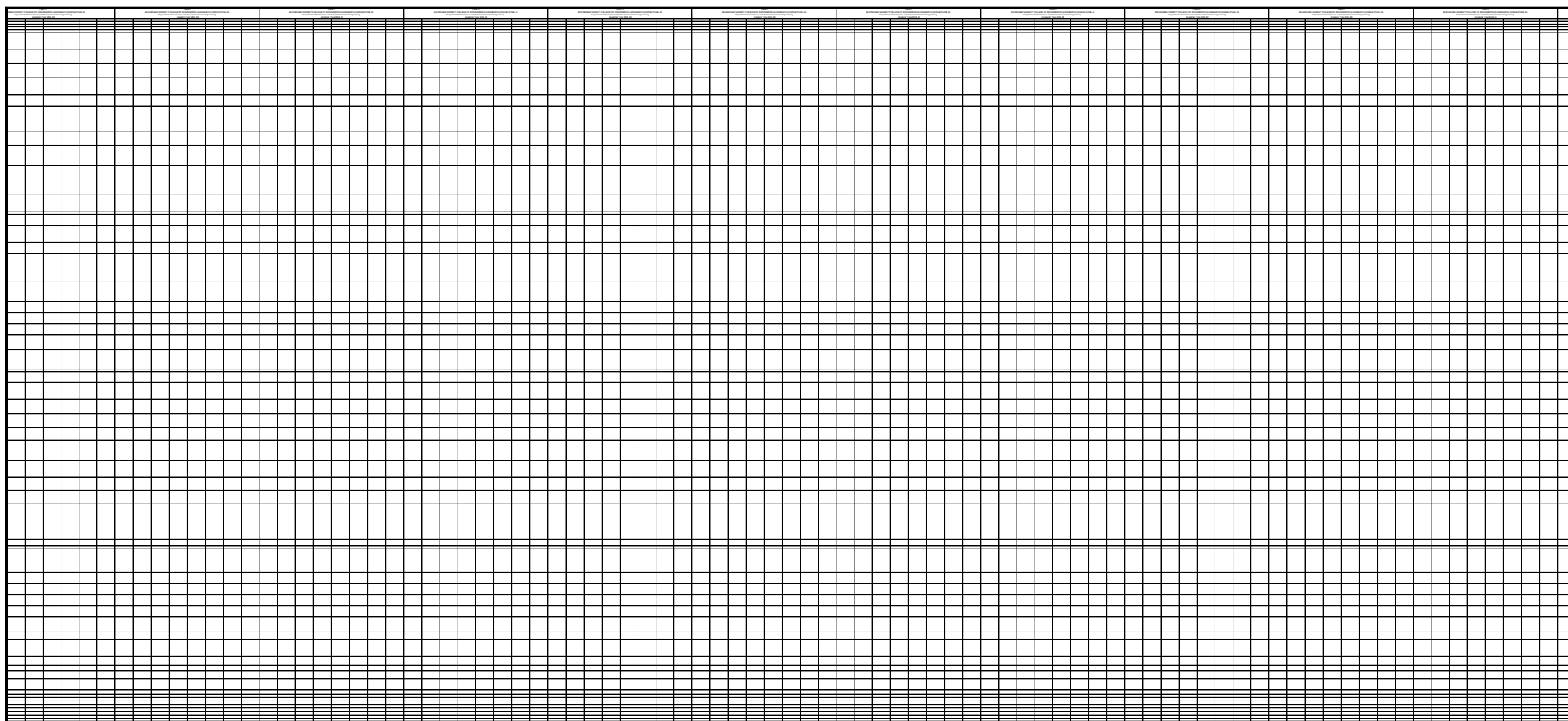




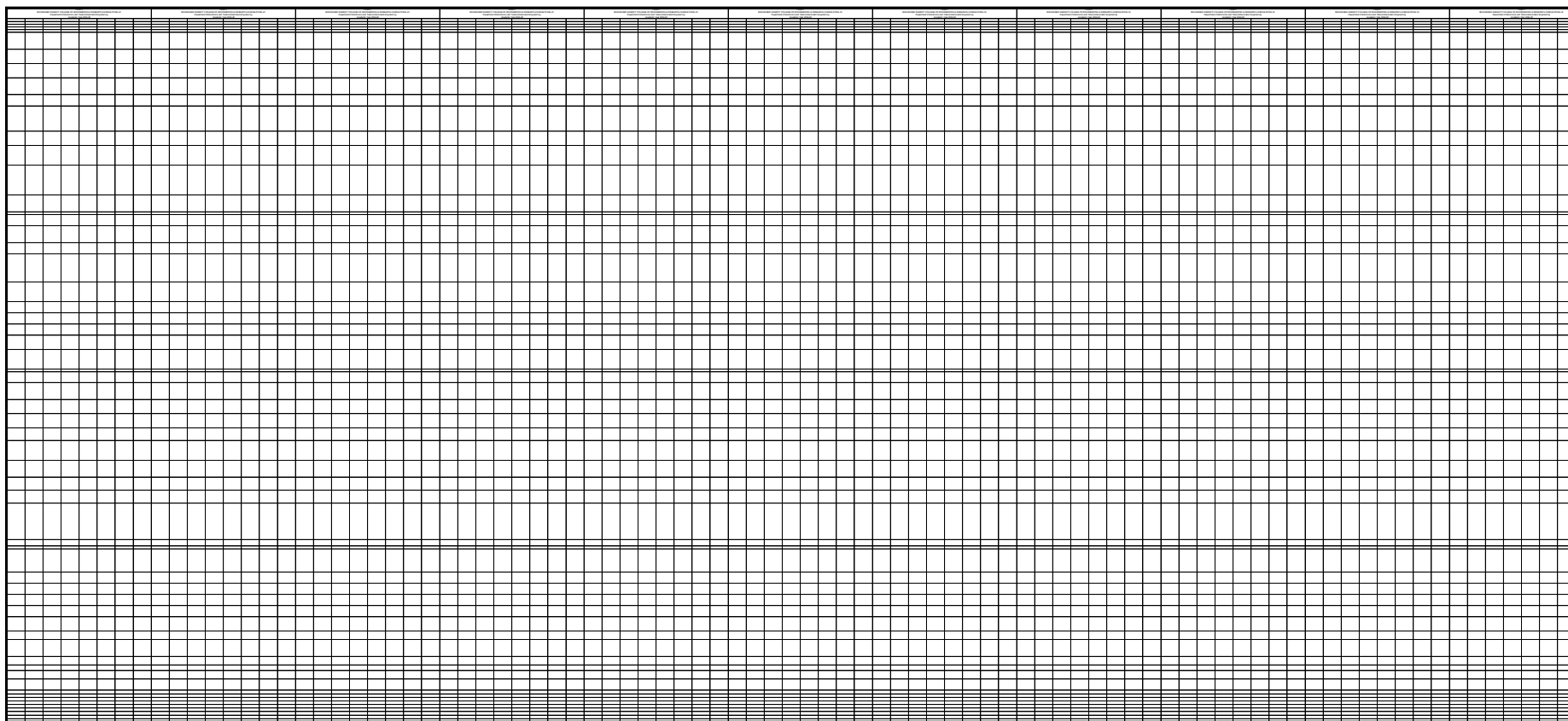


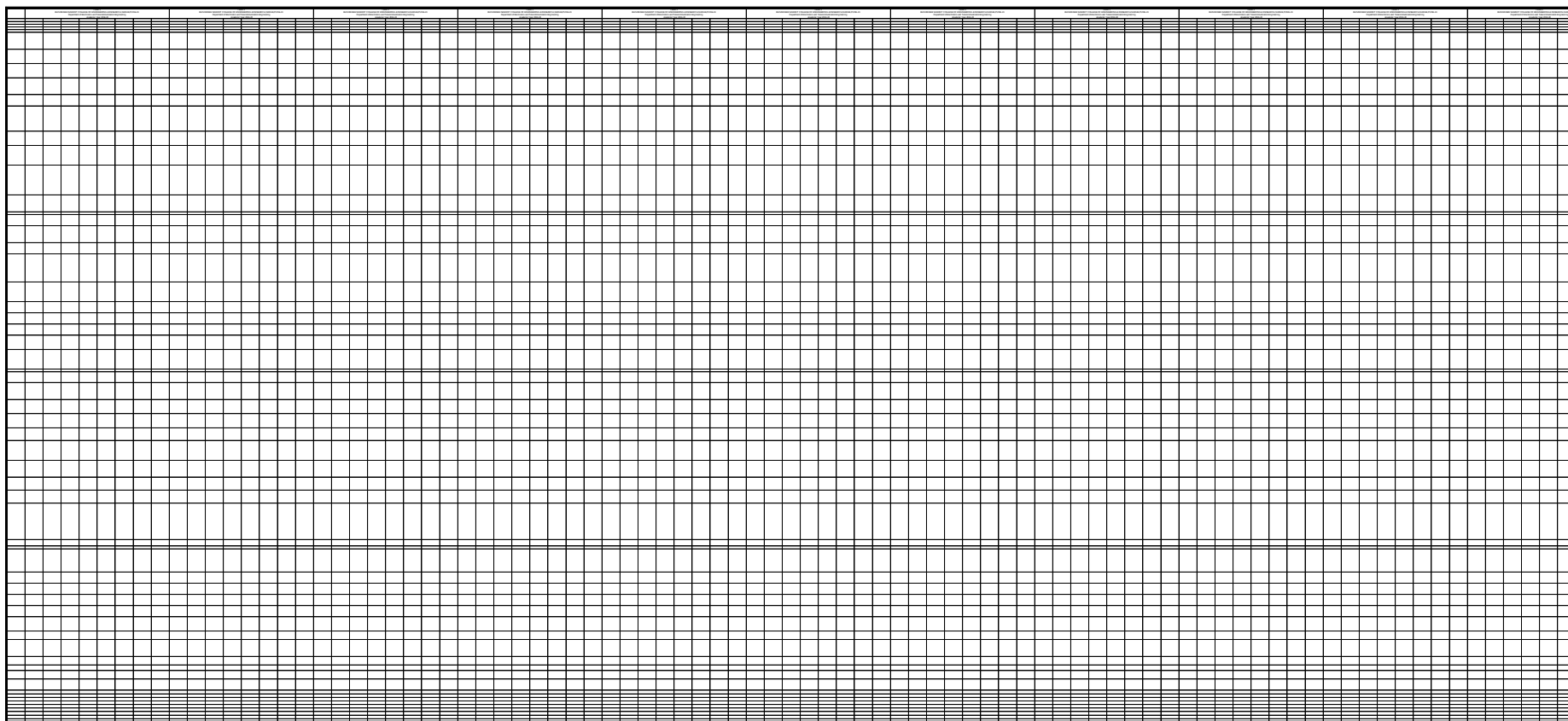


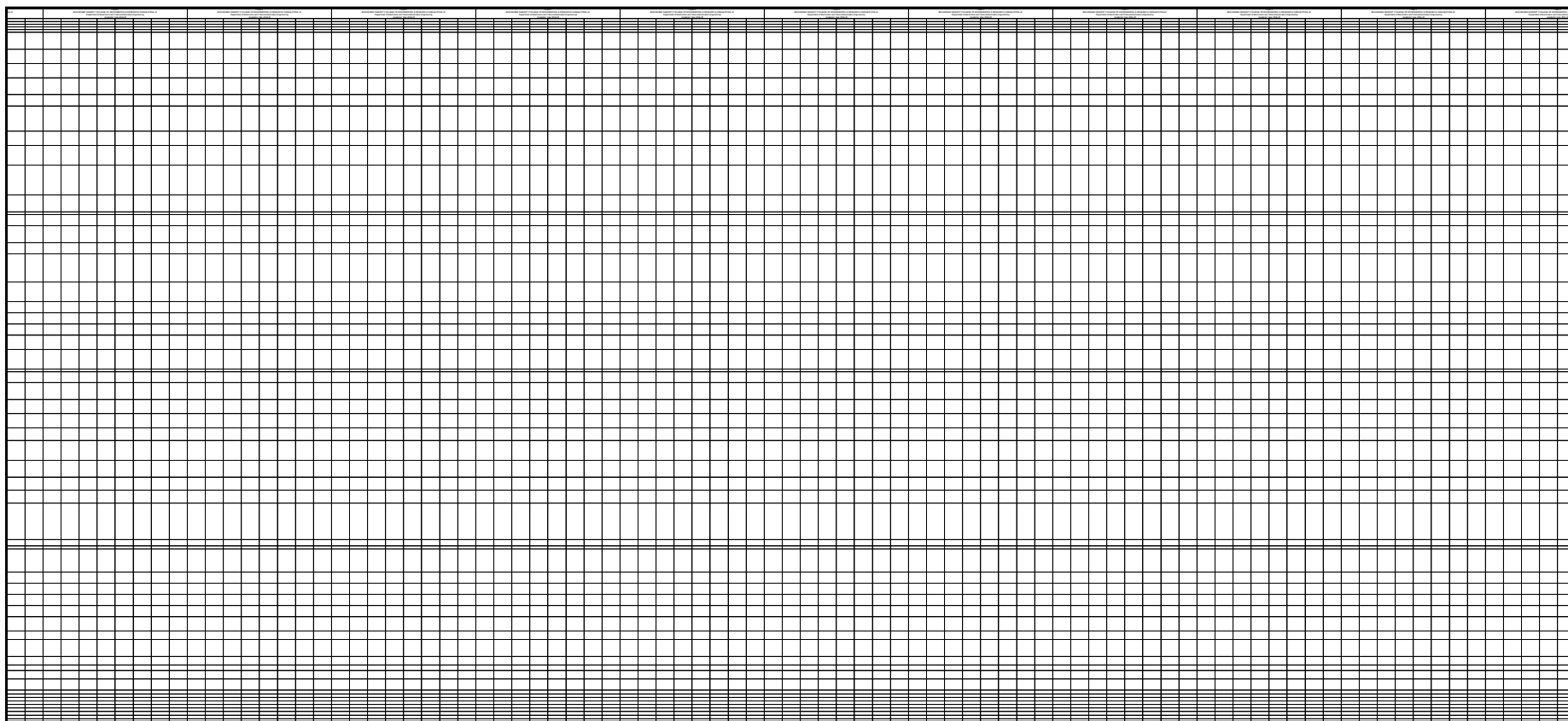


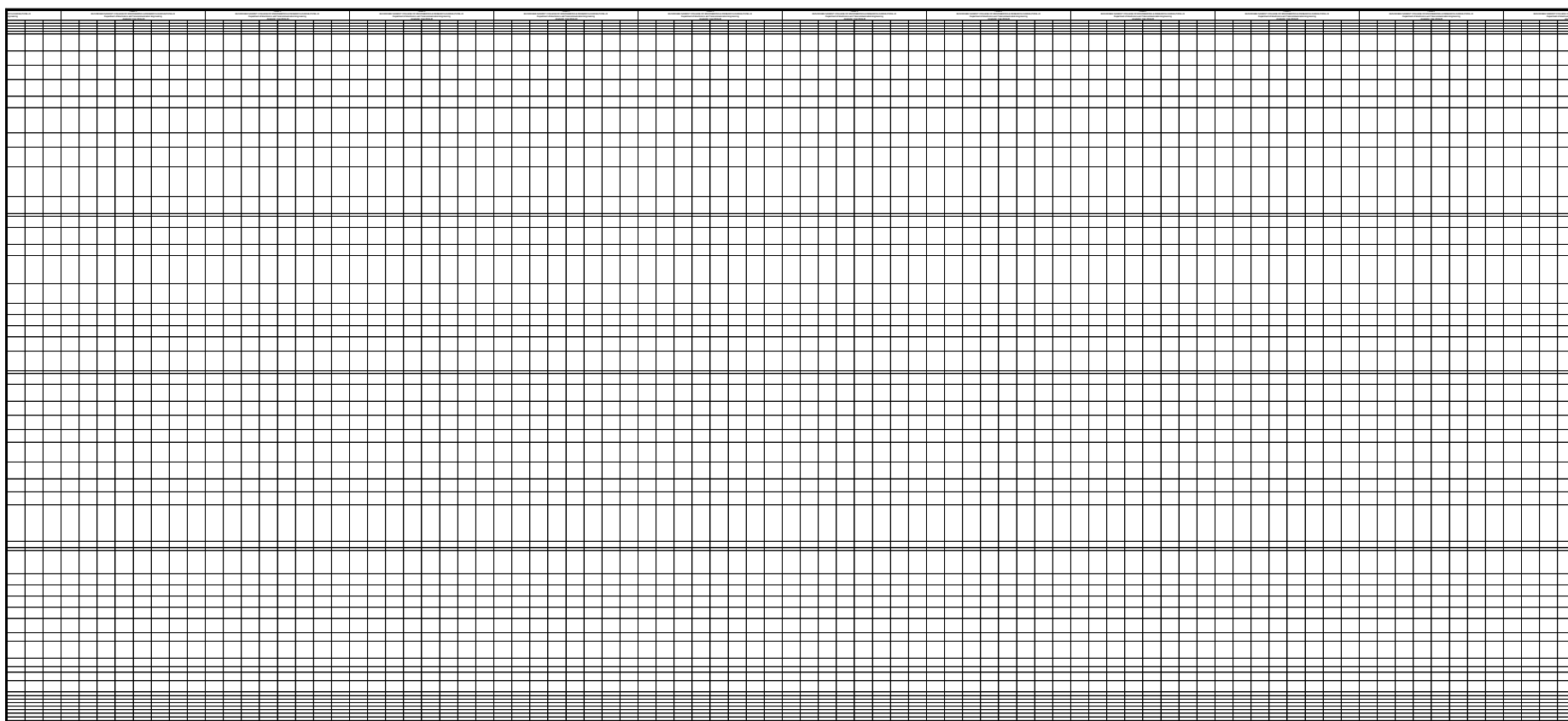


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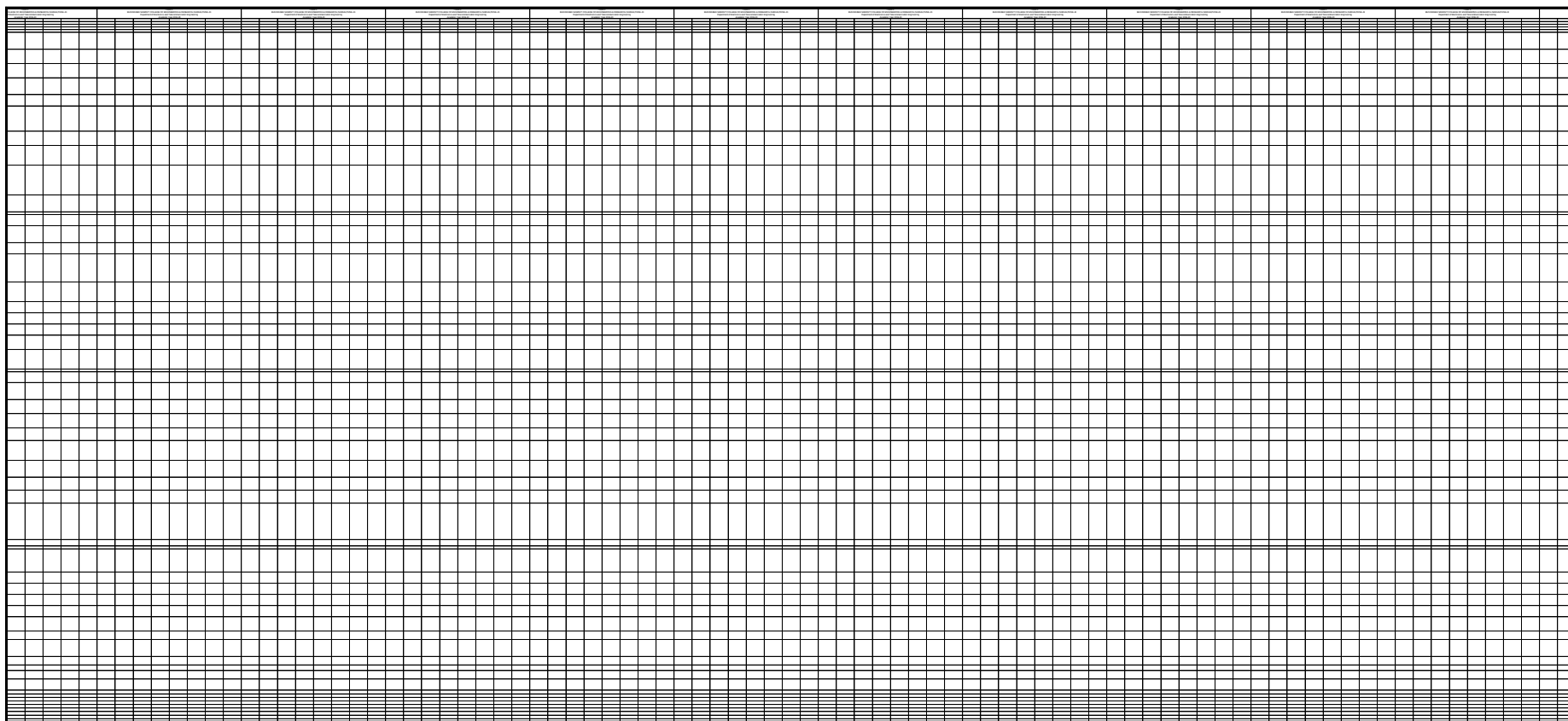


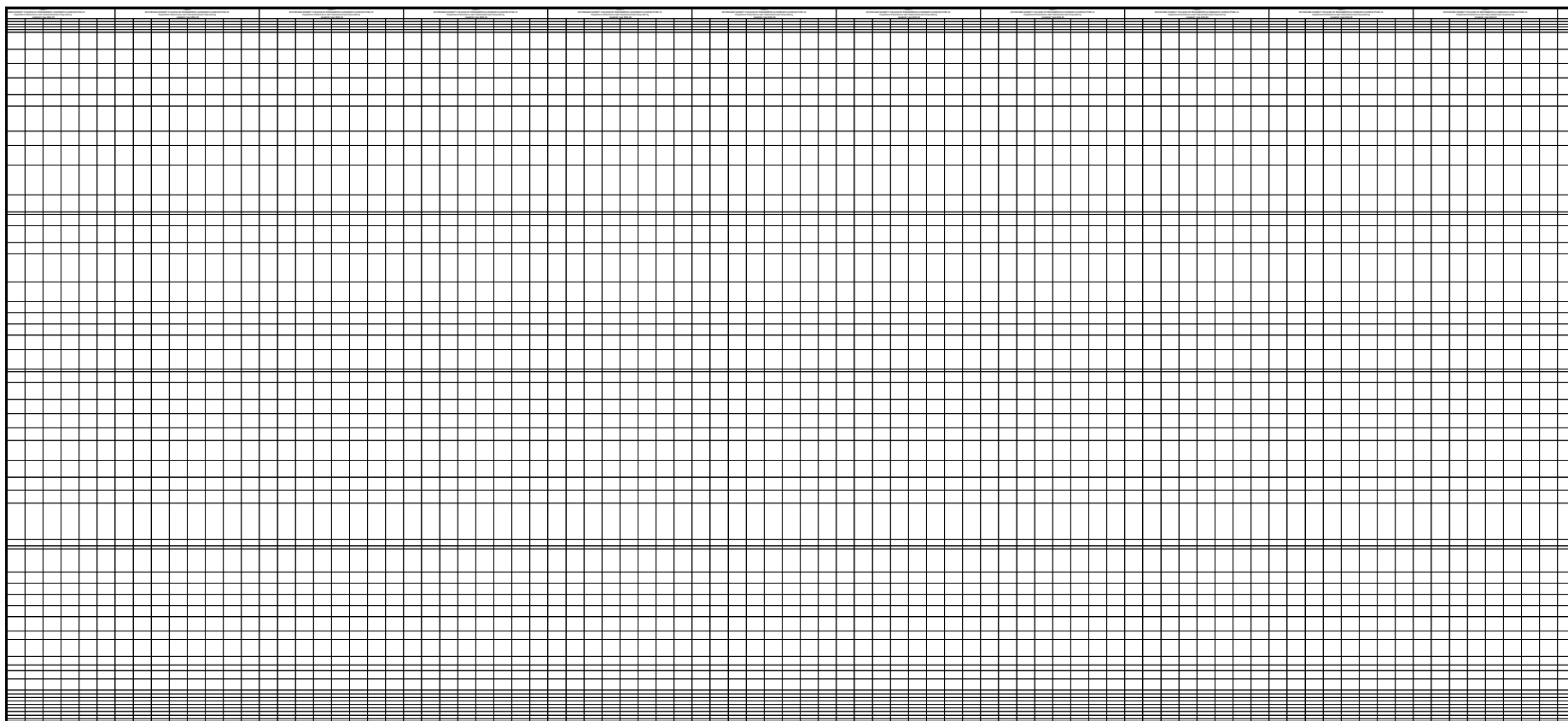




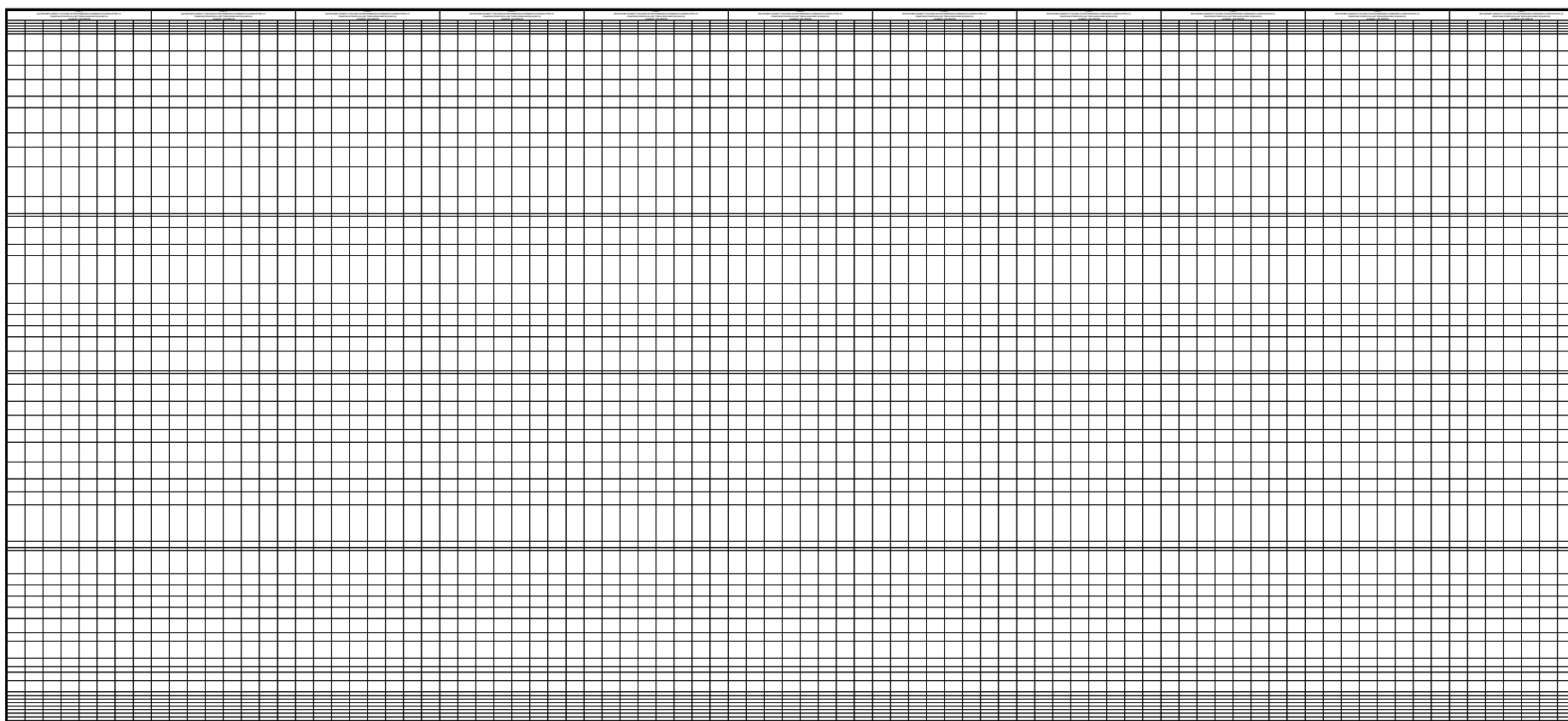


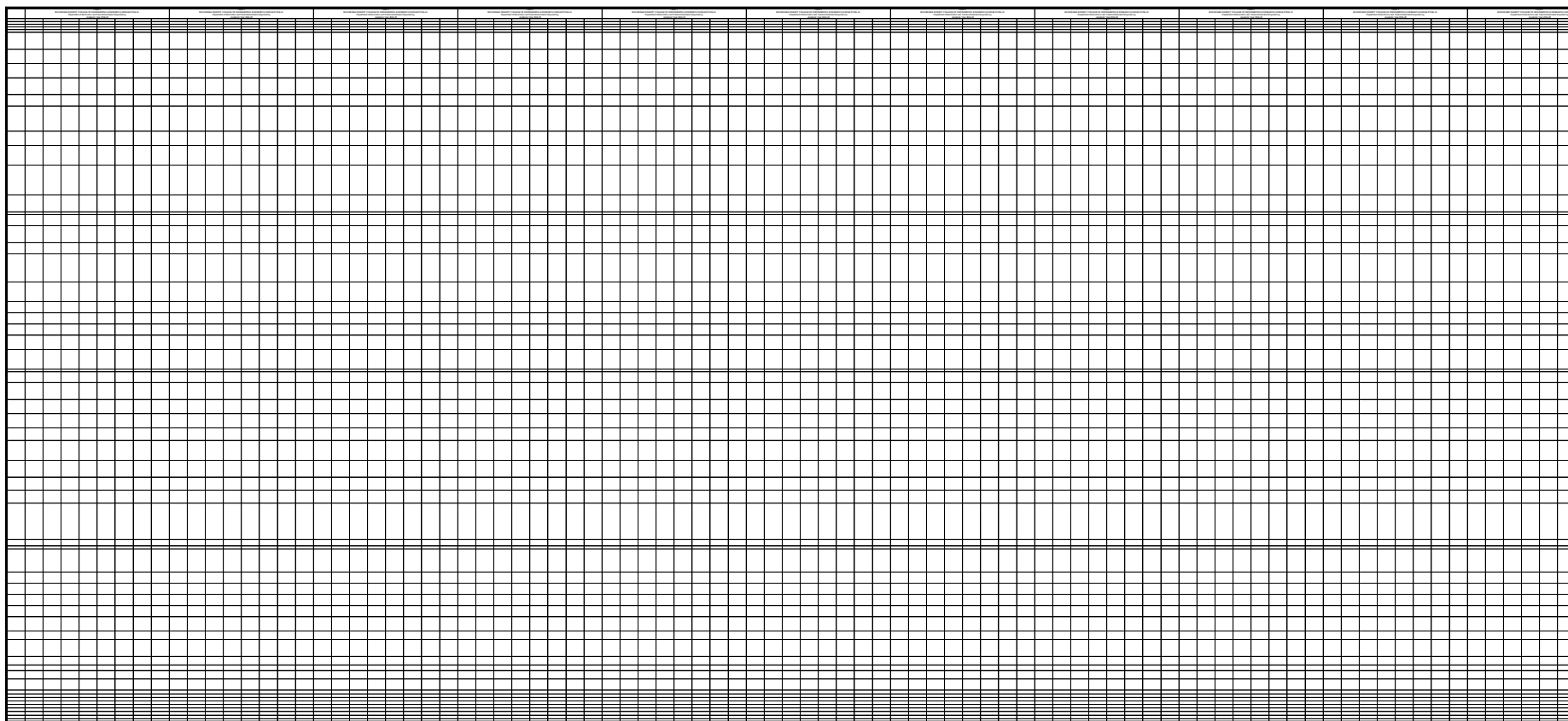
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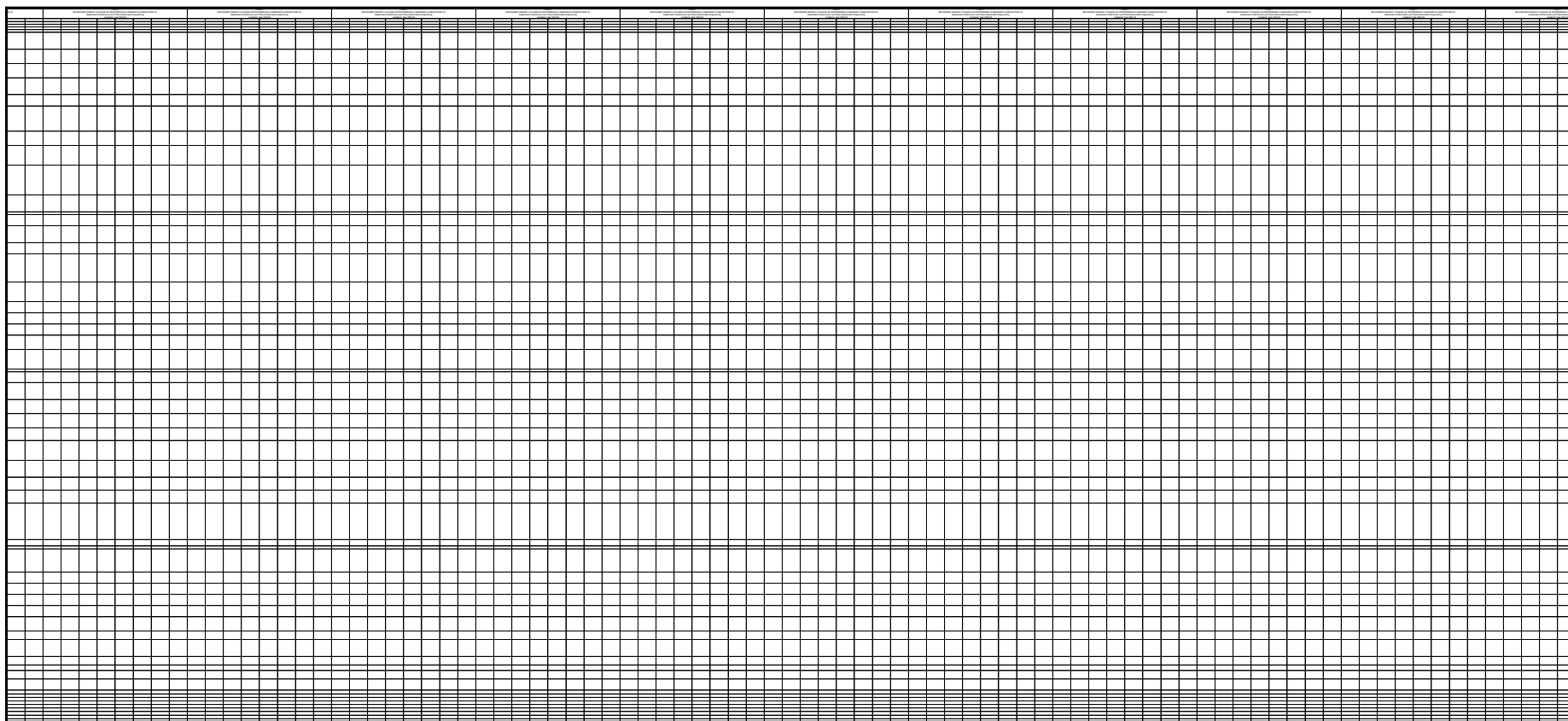


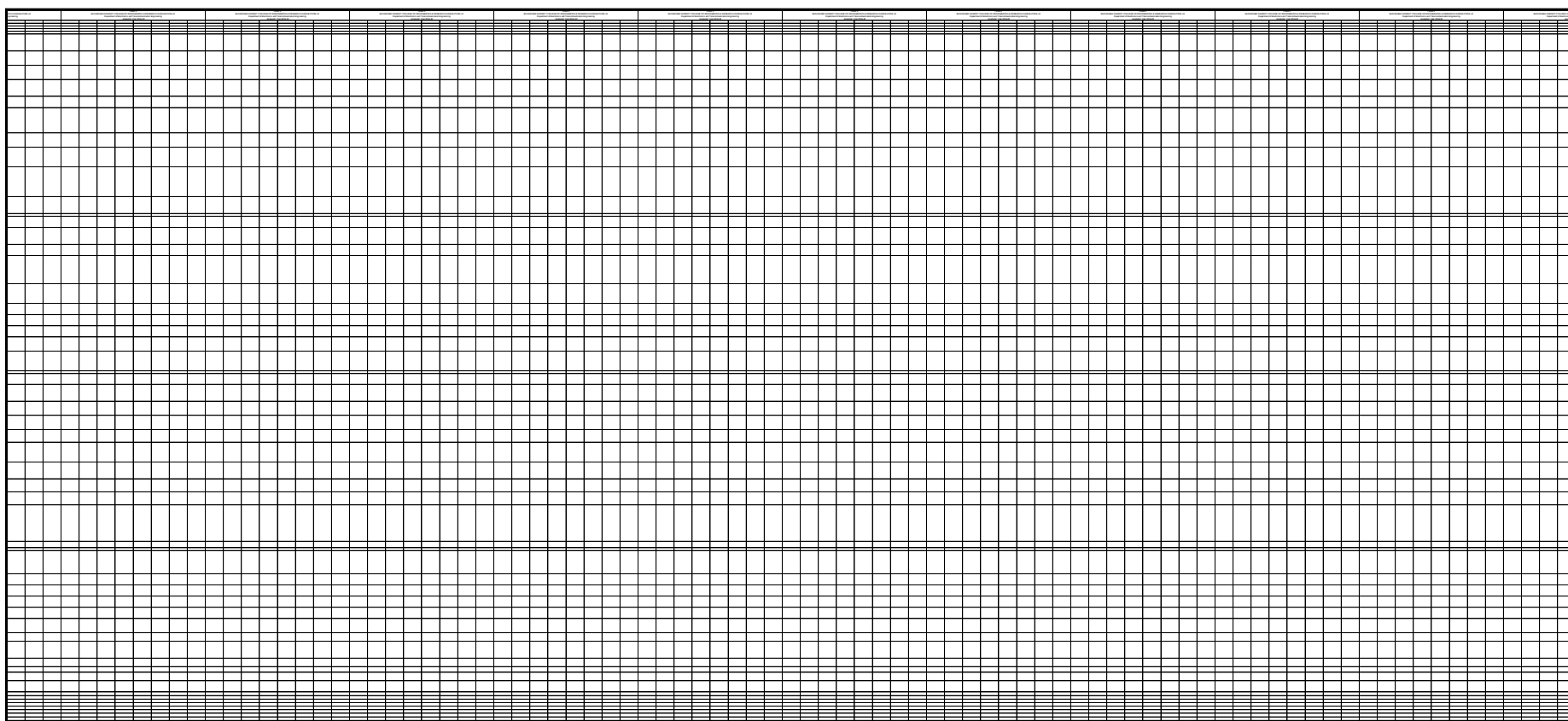


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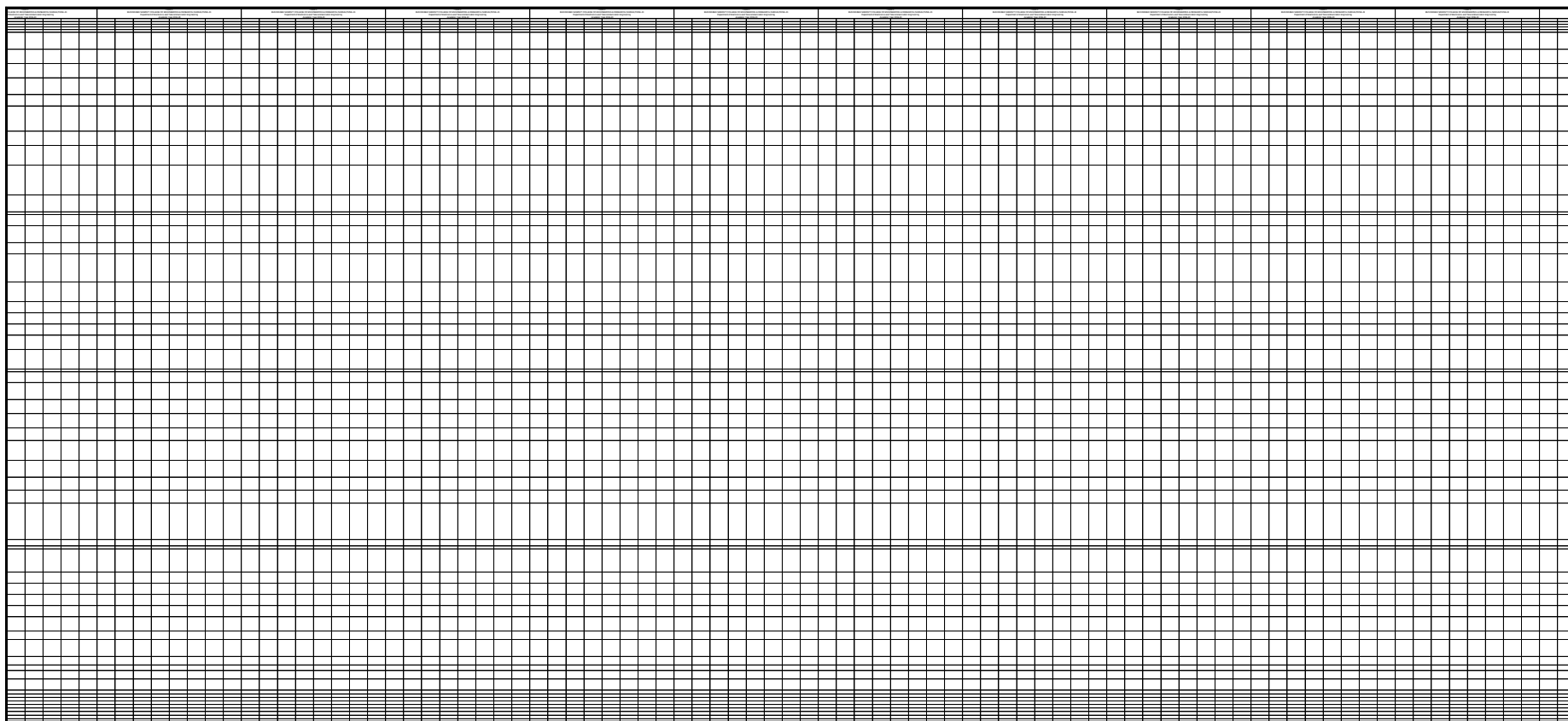


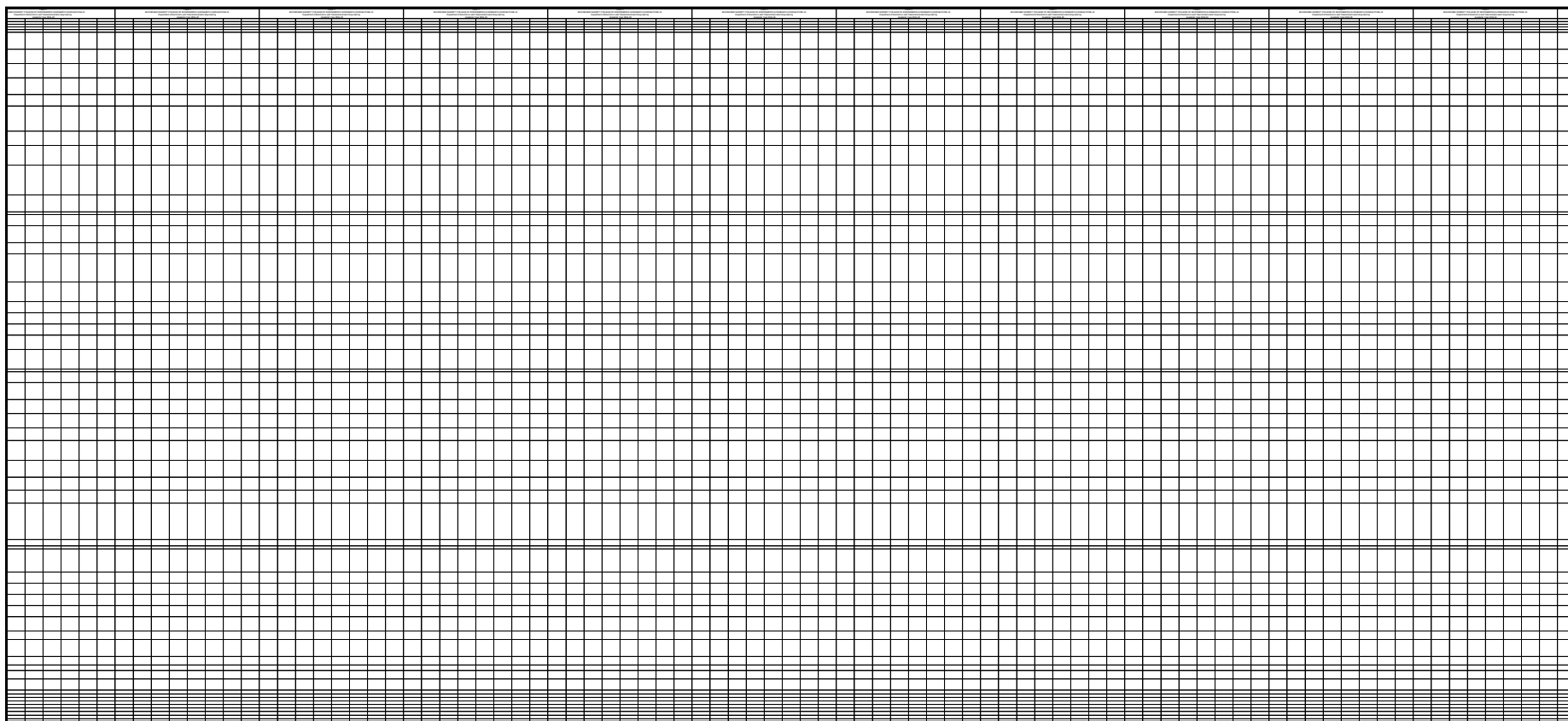




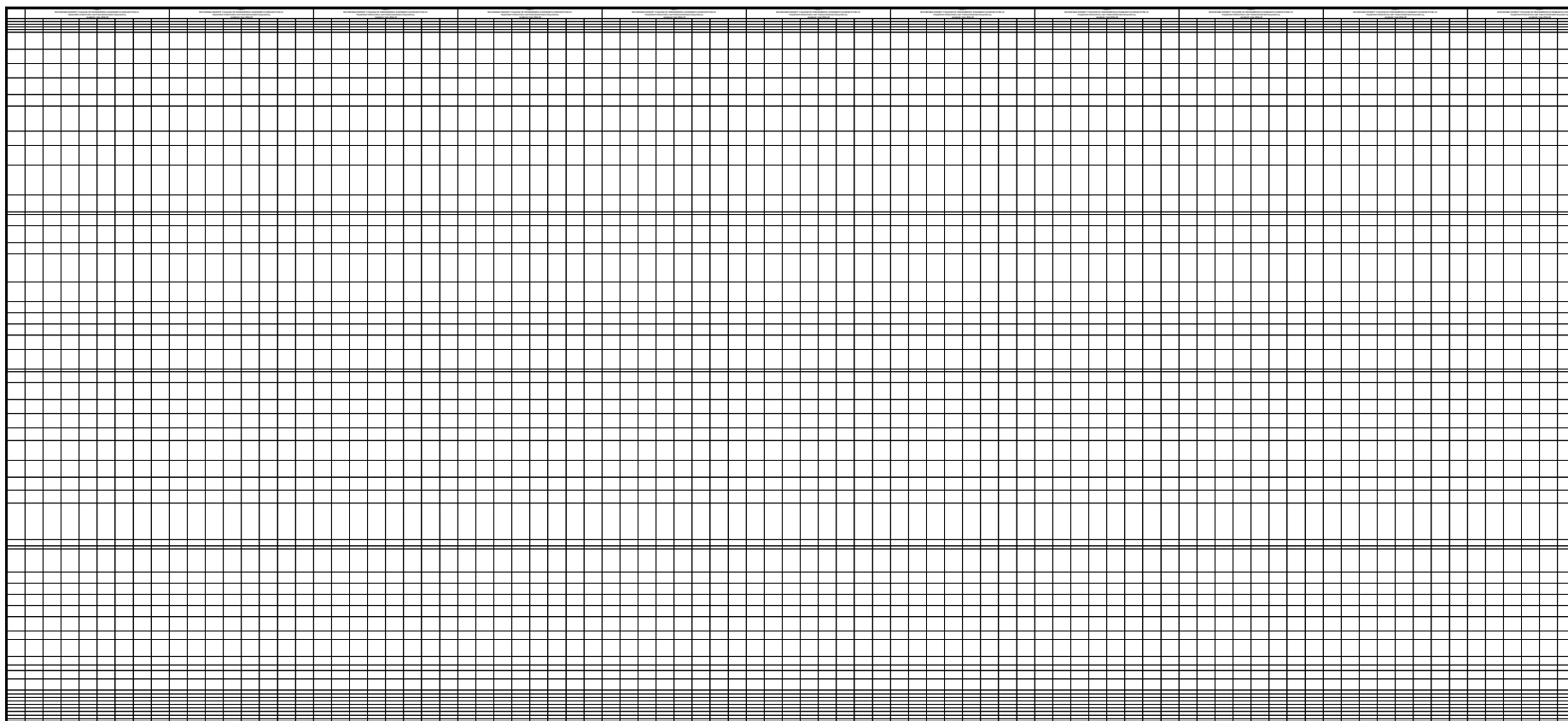


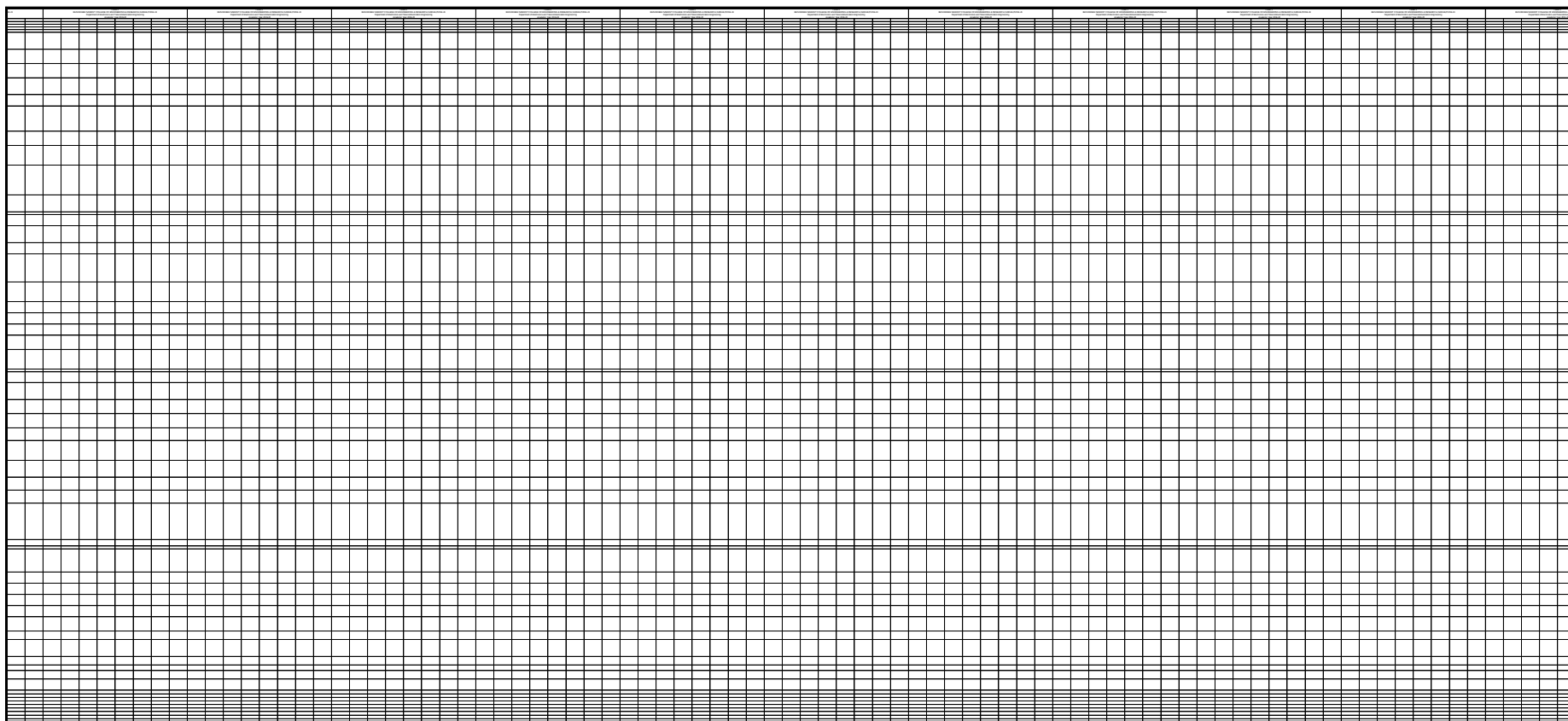
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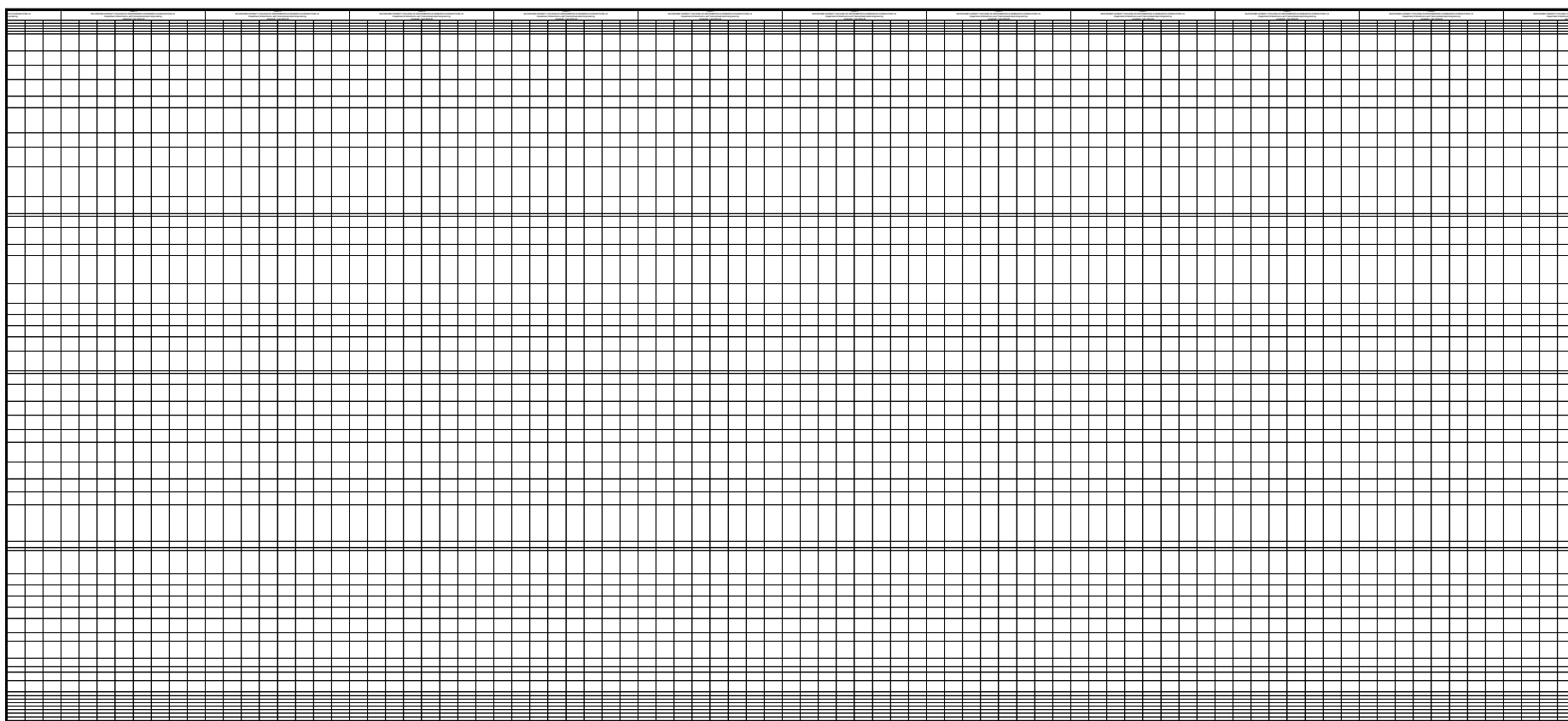




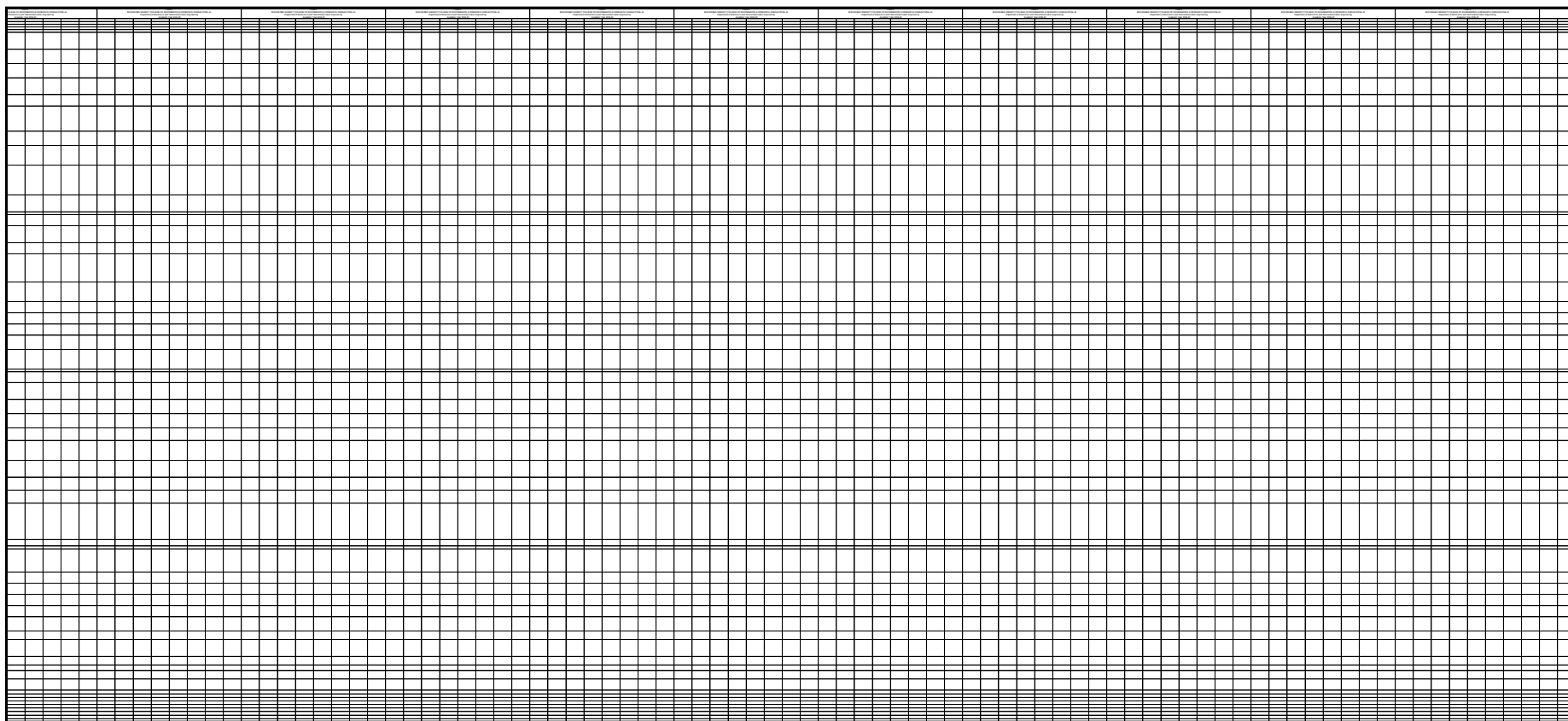
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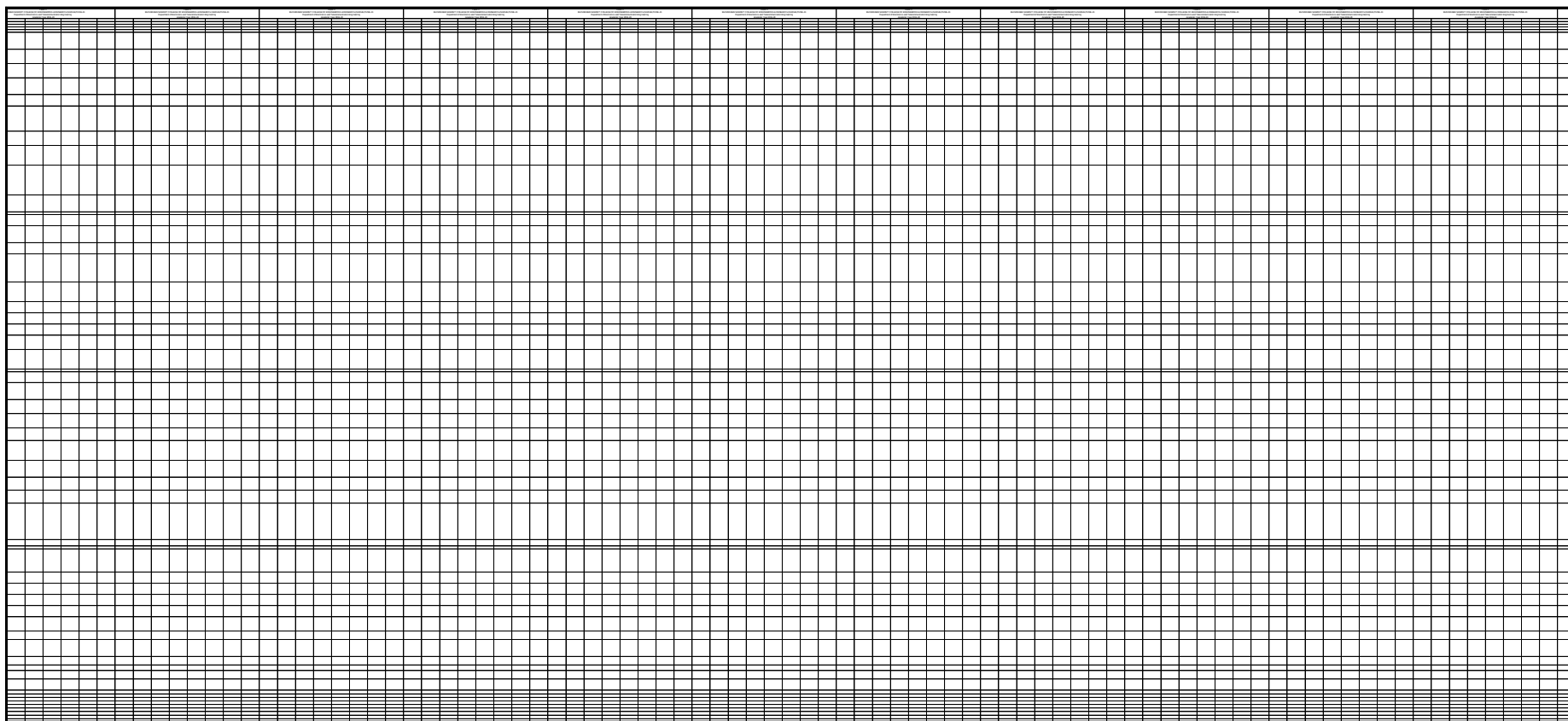




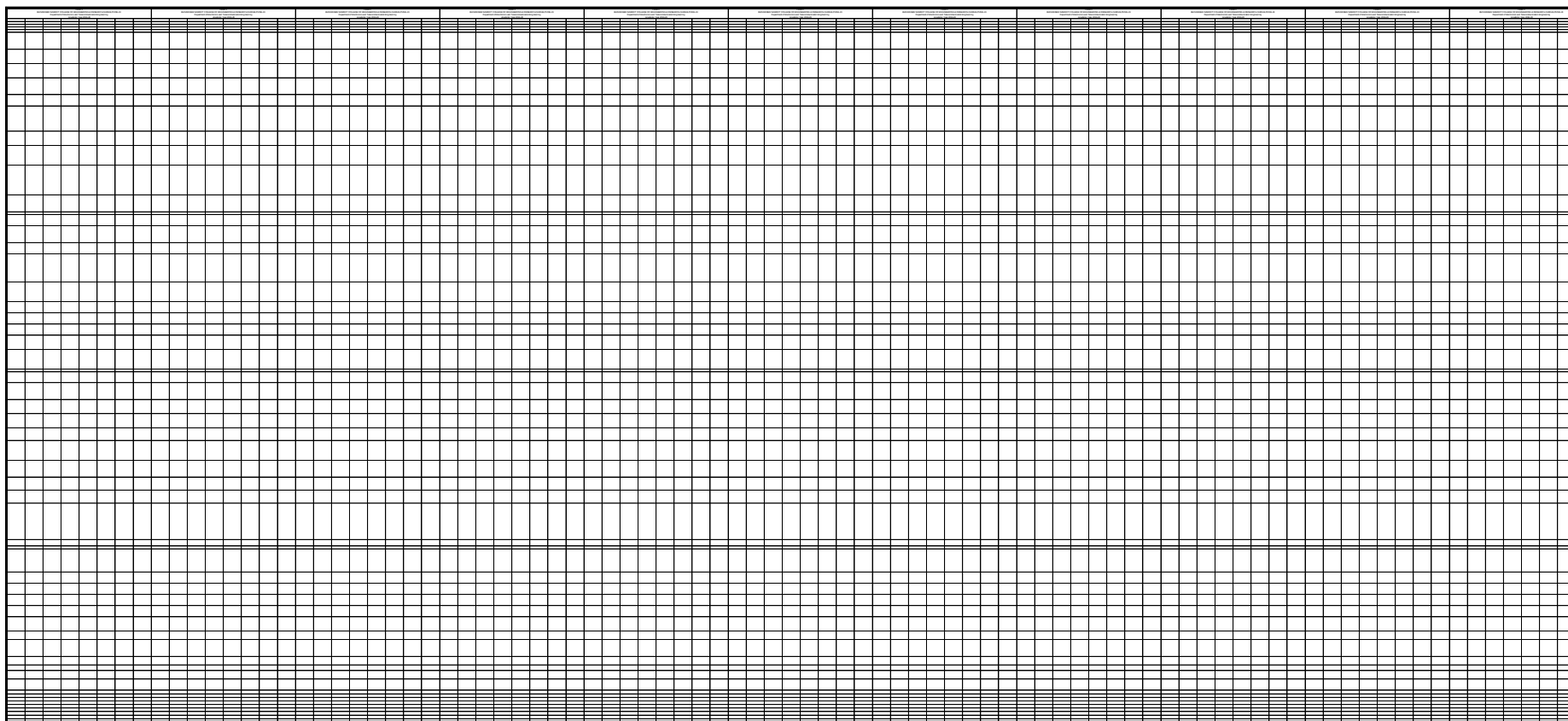


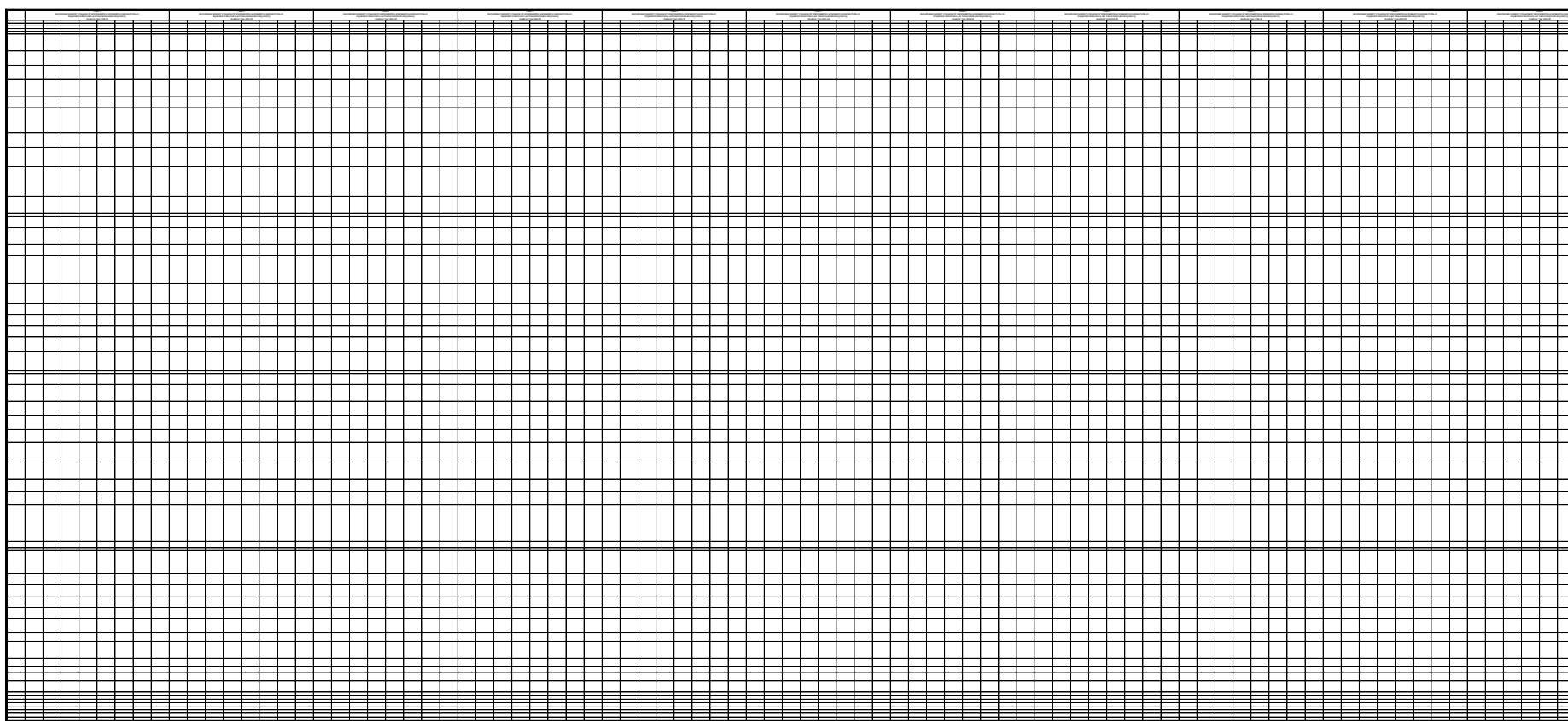
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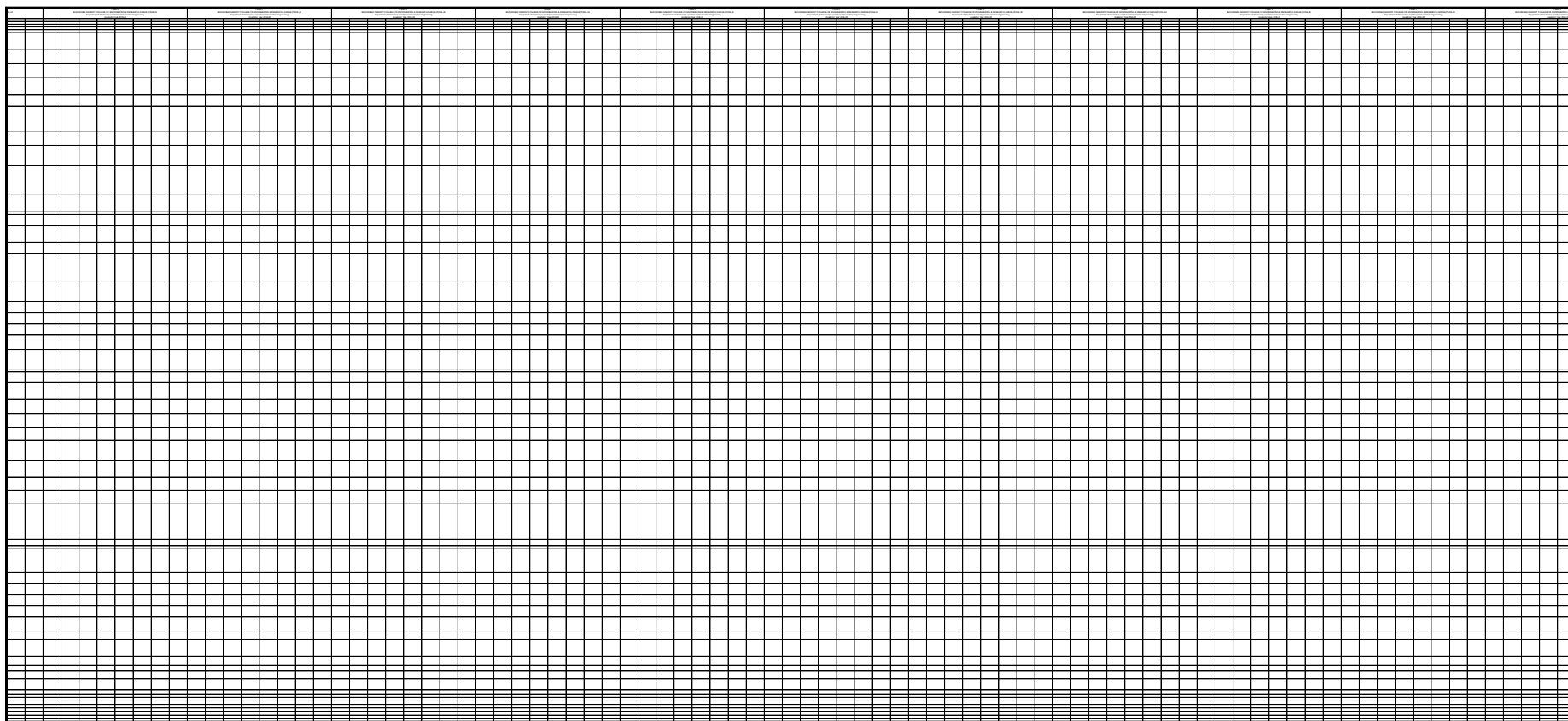


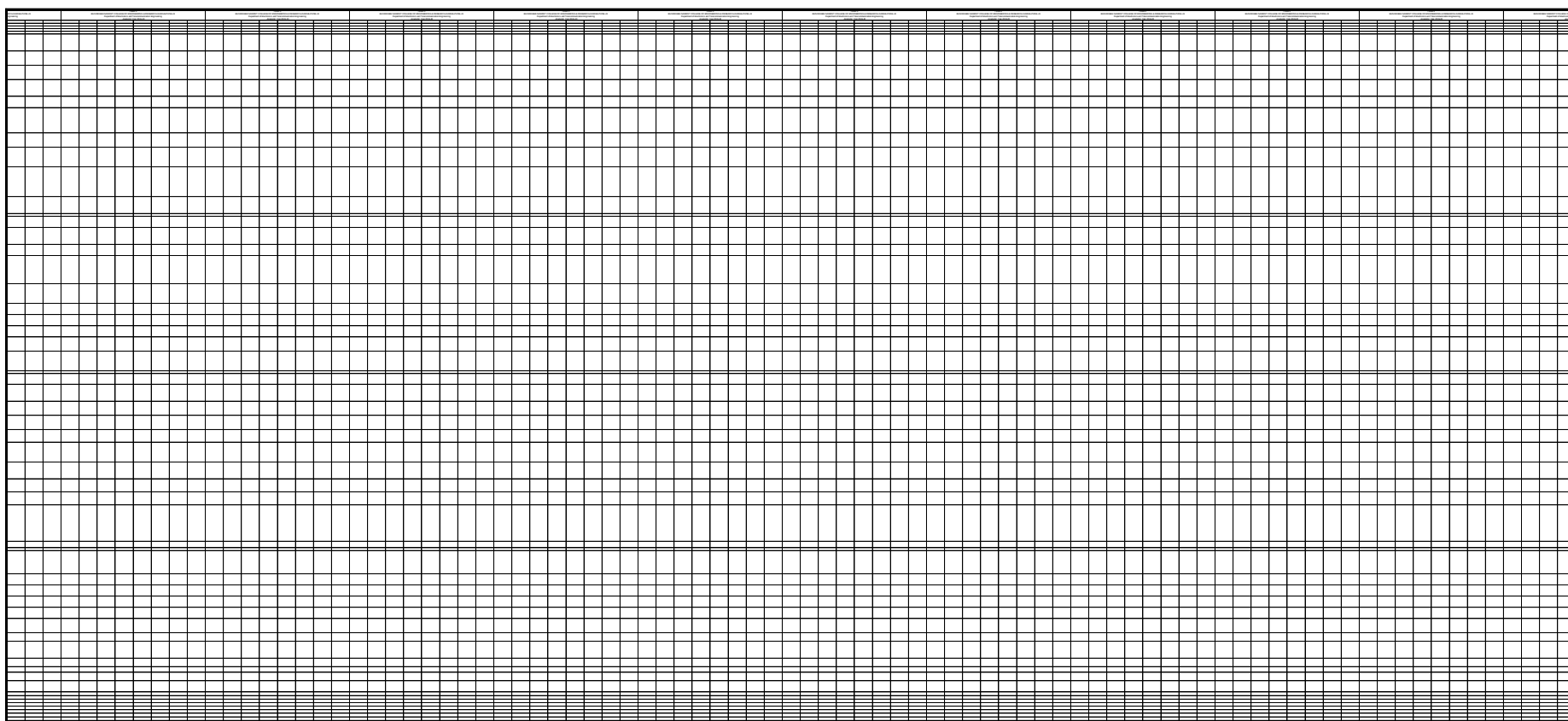


Date										Time										Temperature										Humidity										Wind Speed										Wind Direction										Cloud Cover										Precipitation										Soil Moisture										Air Quality										Other Data										Notes										Remarks										Total										Average										Standard Deviation										Coefficient of Variation										Correlation Coefficient										Regression Line										R-squared										P-value										Significance Level										Confidence Interval										Hypothesis Test										Conclusion										Final Remarks										Overall Summary										Data Source										Data Collection Method										Data Analysis Method										Data Interpretation										Data Conclusion										Data Recommendation										Data Action Plan										Data Follow-up										Data Review										Data Approval										Data Signature										Data Date										Data Version										Data Revision										Data Change Log										Data History										Data 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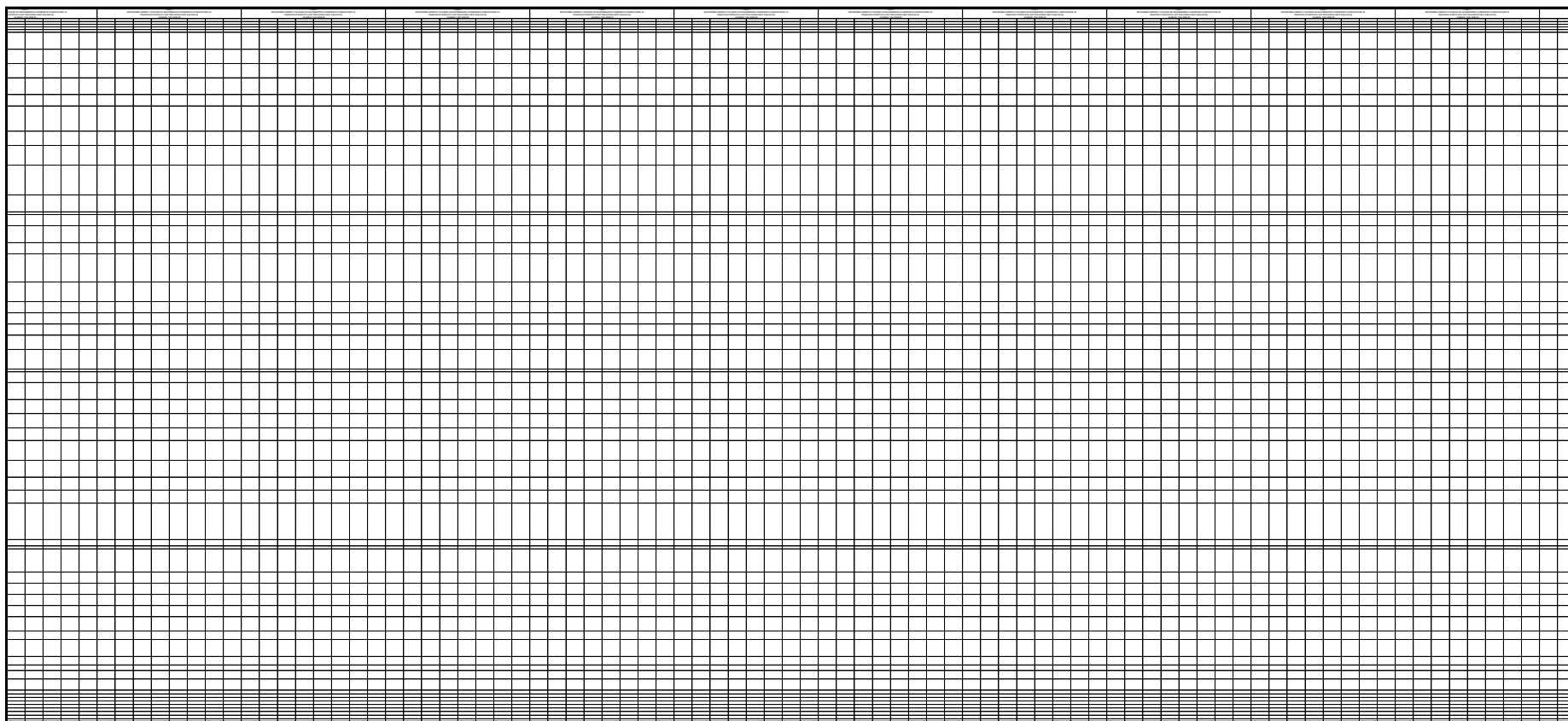


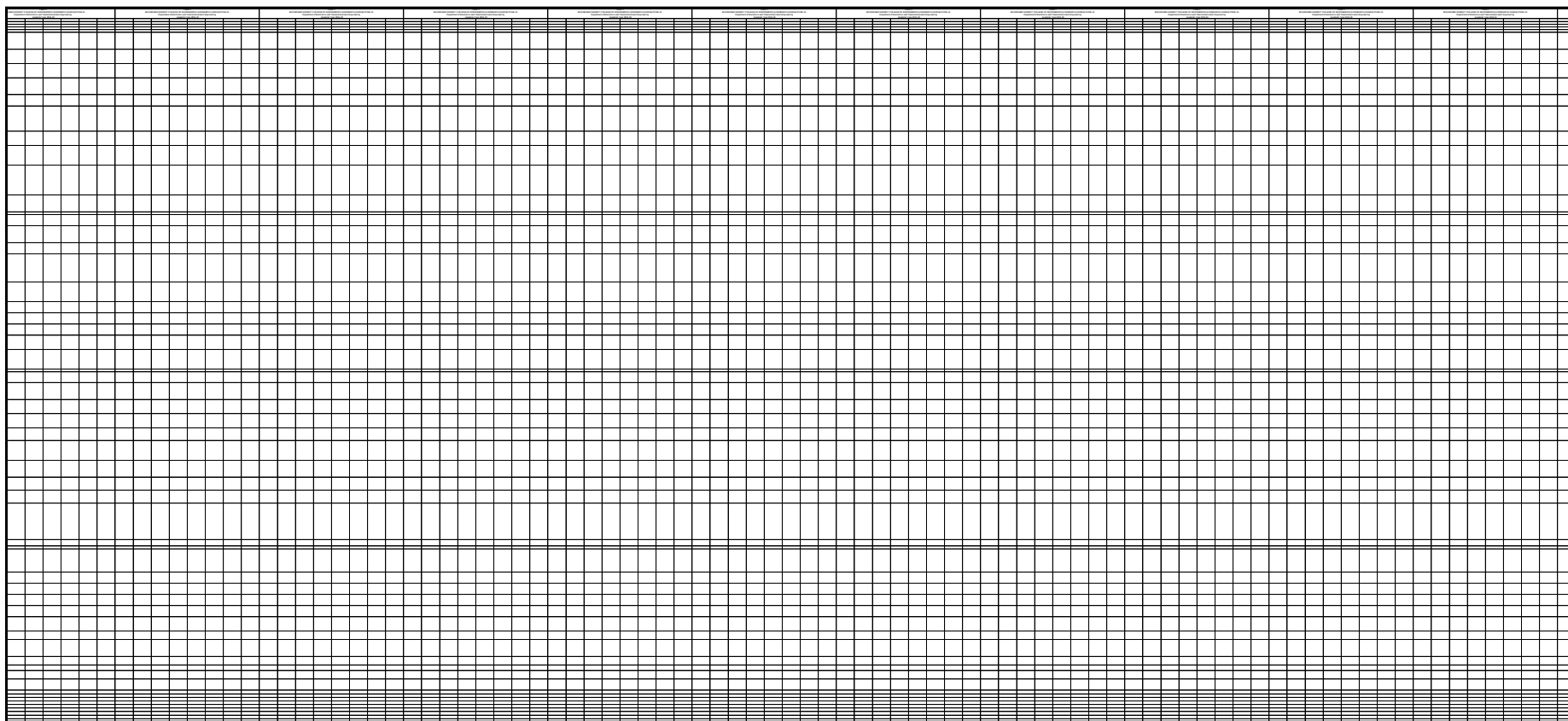


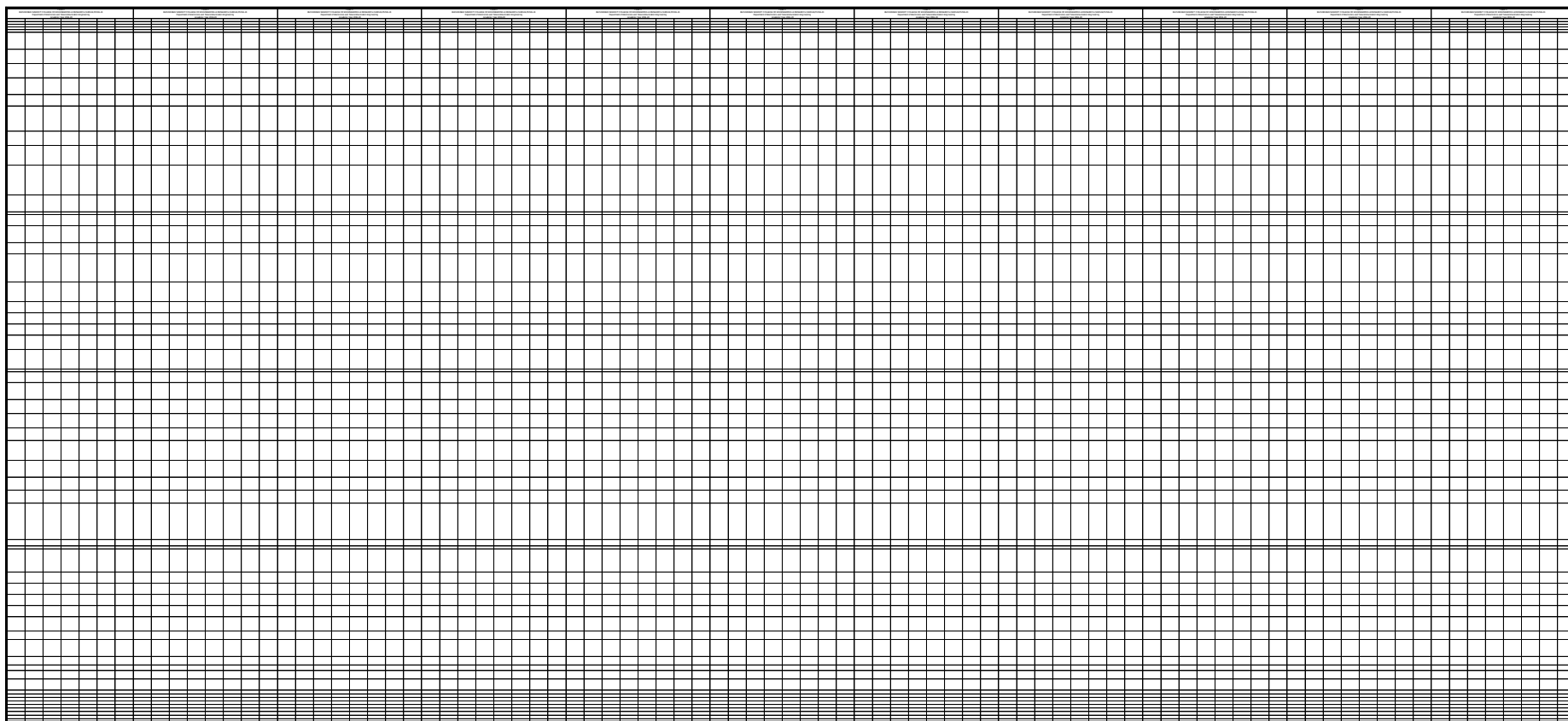


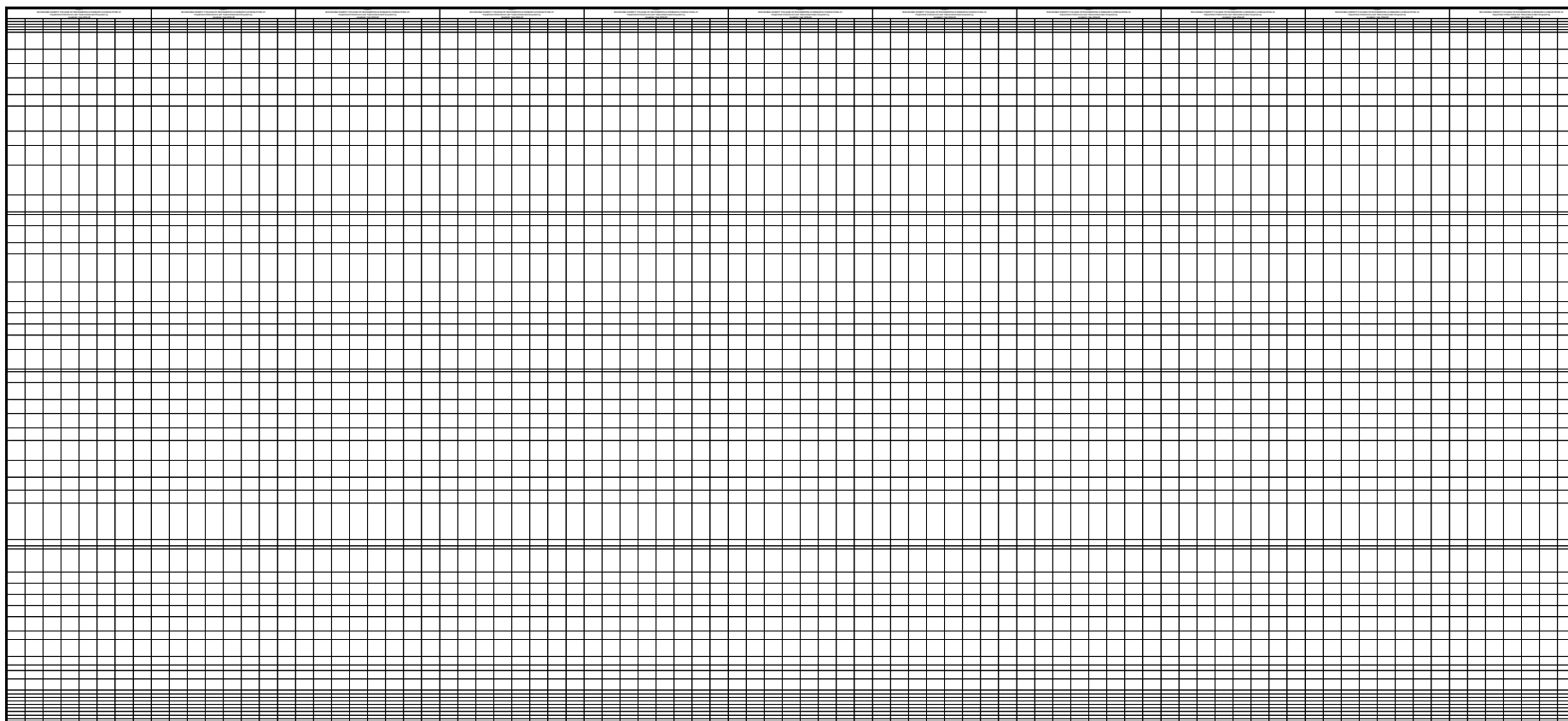


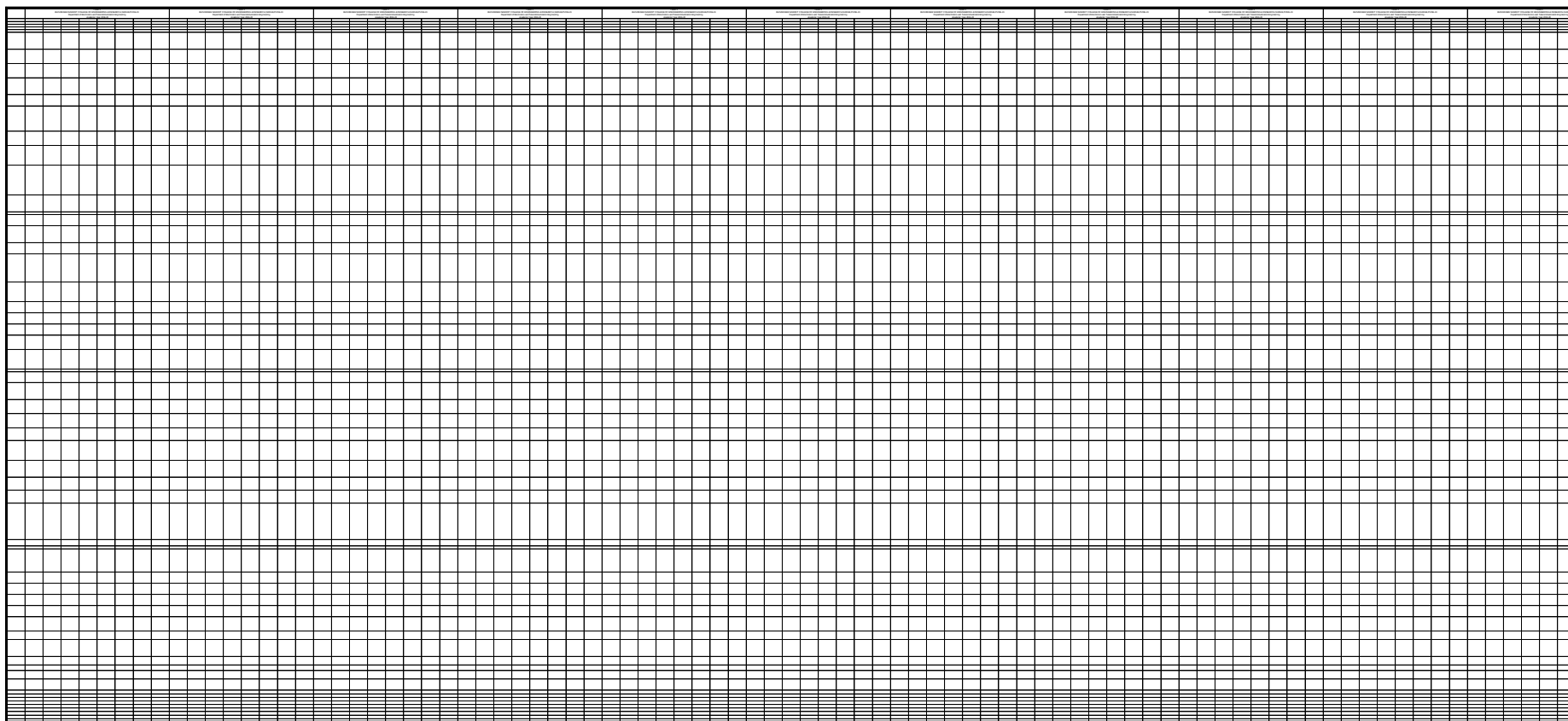
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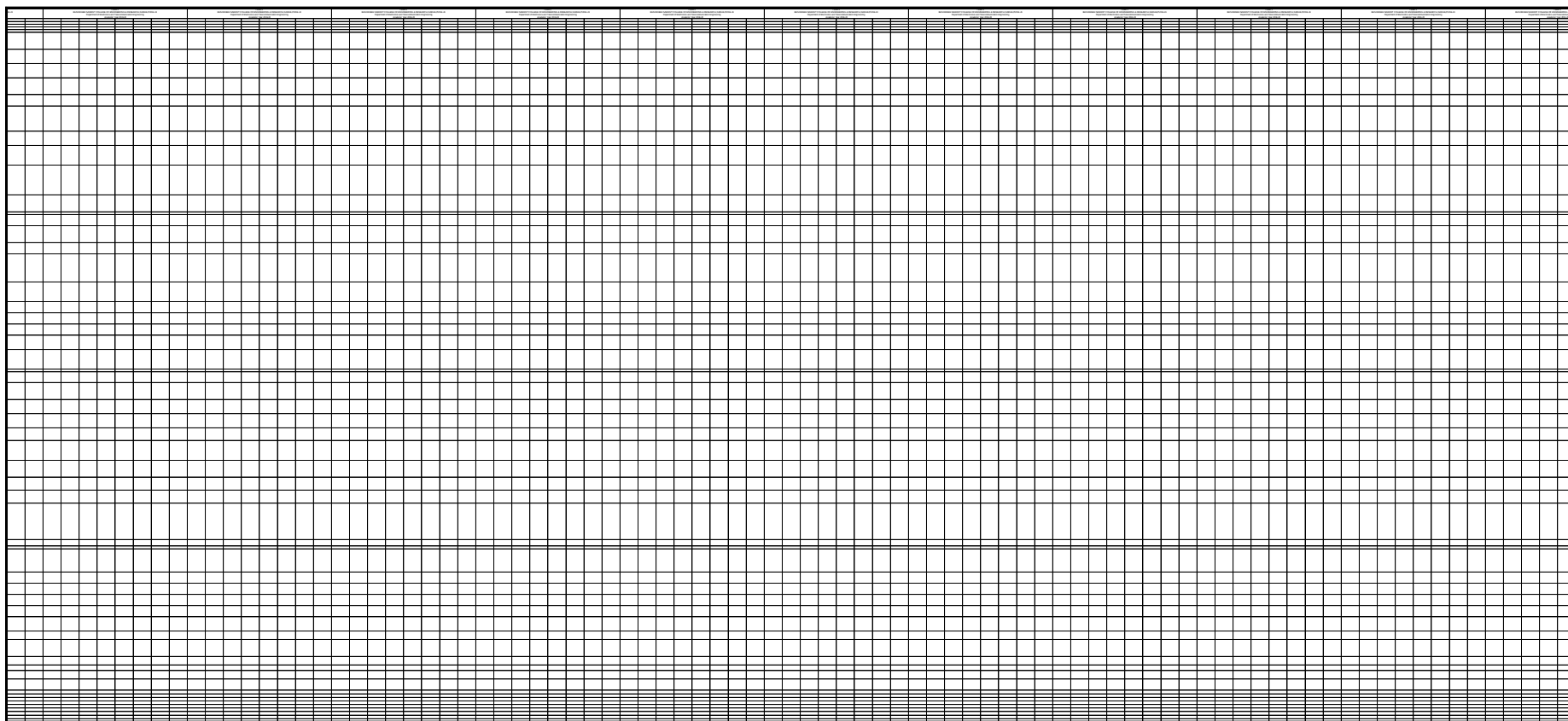


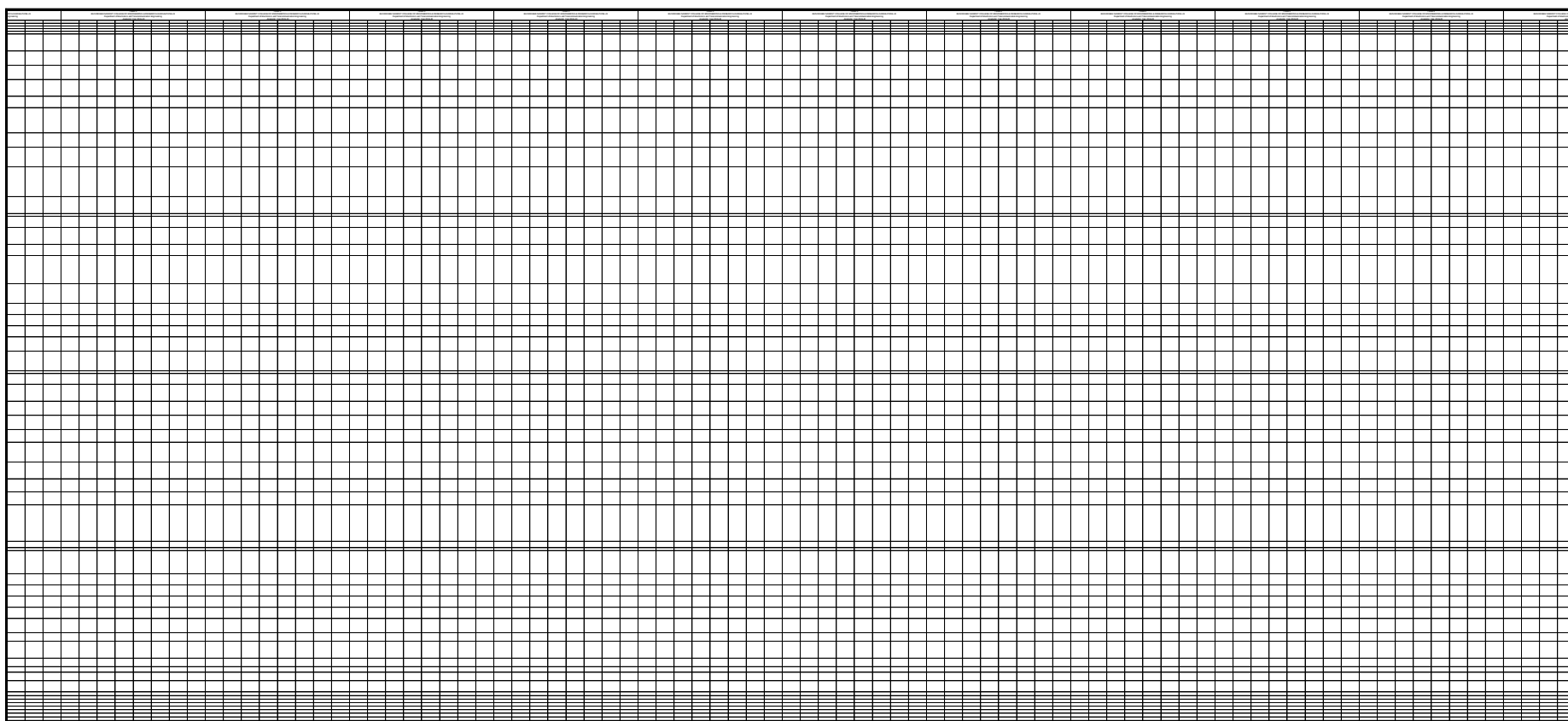


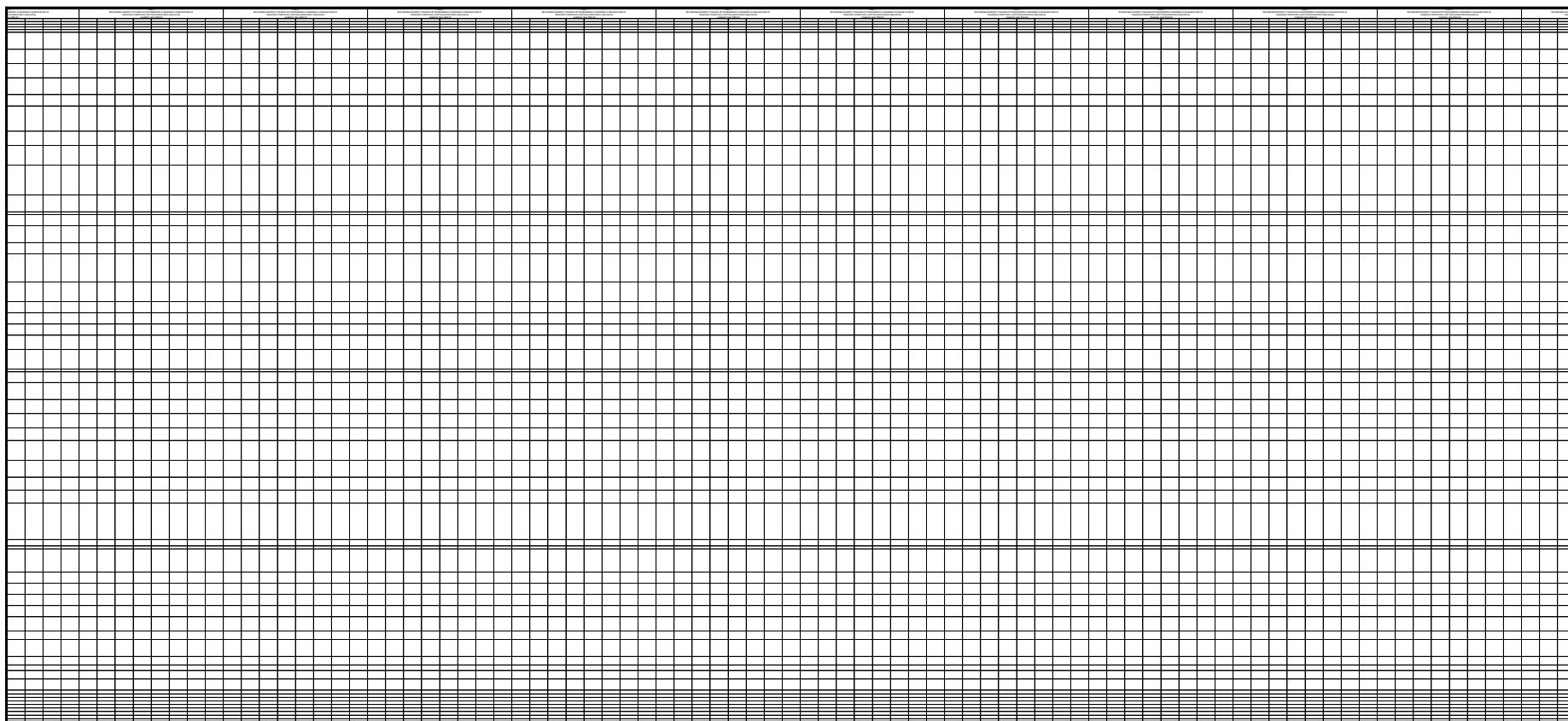


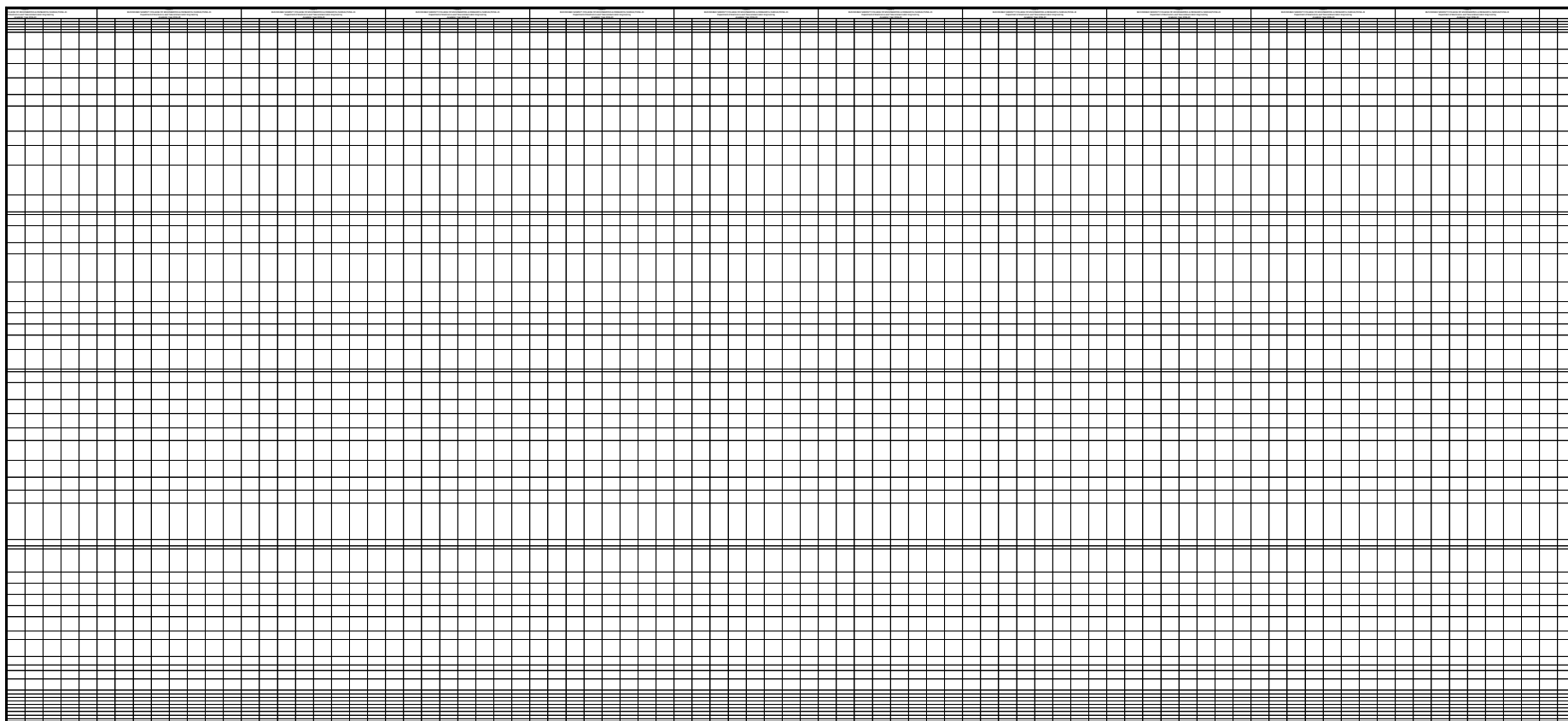


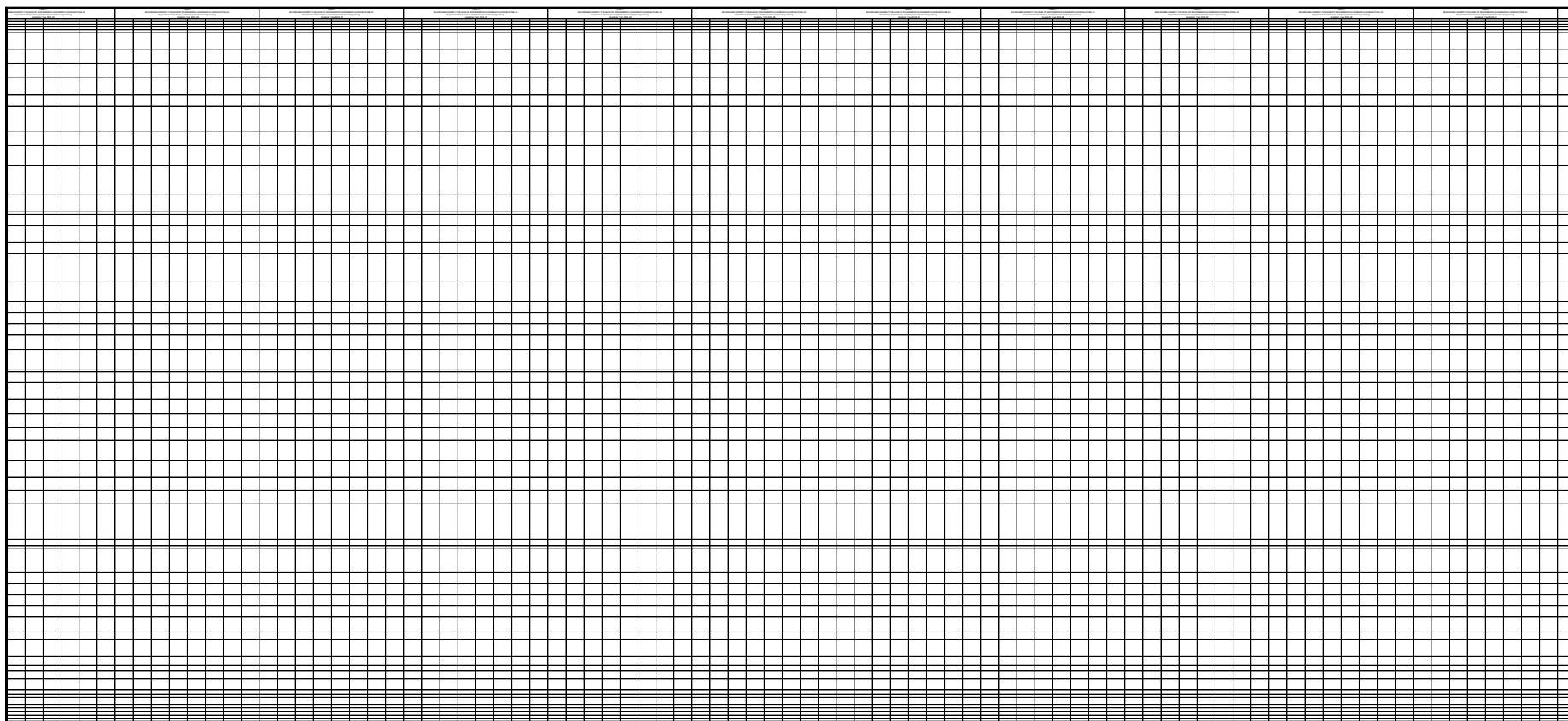




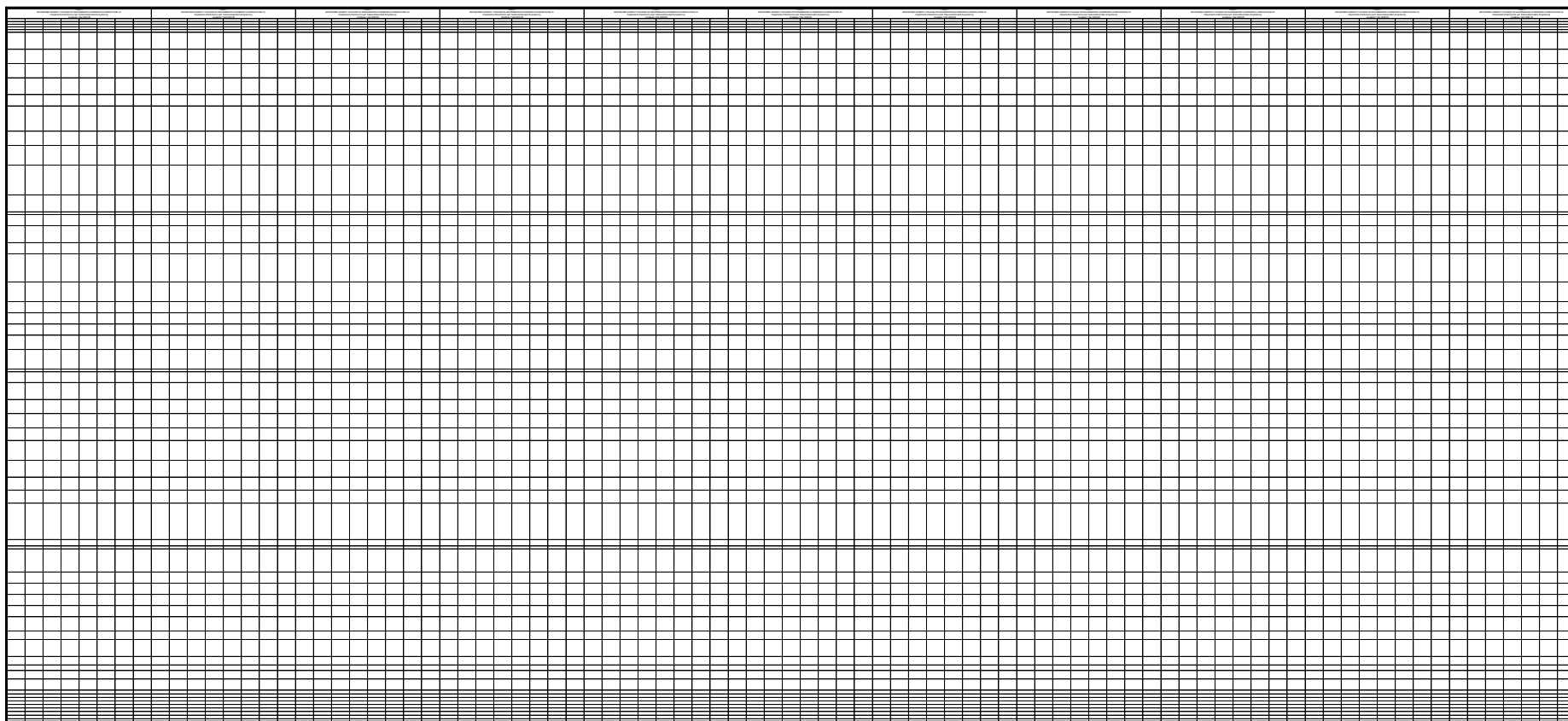


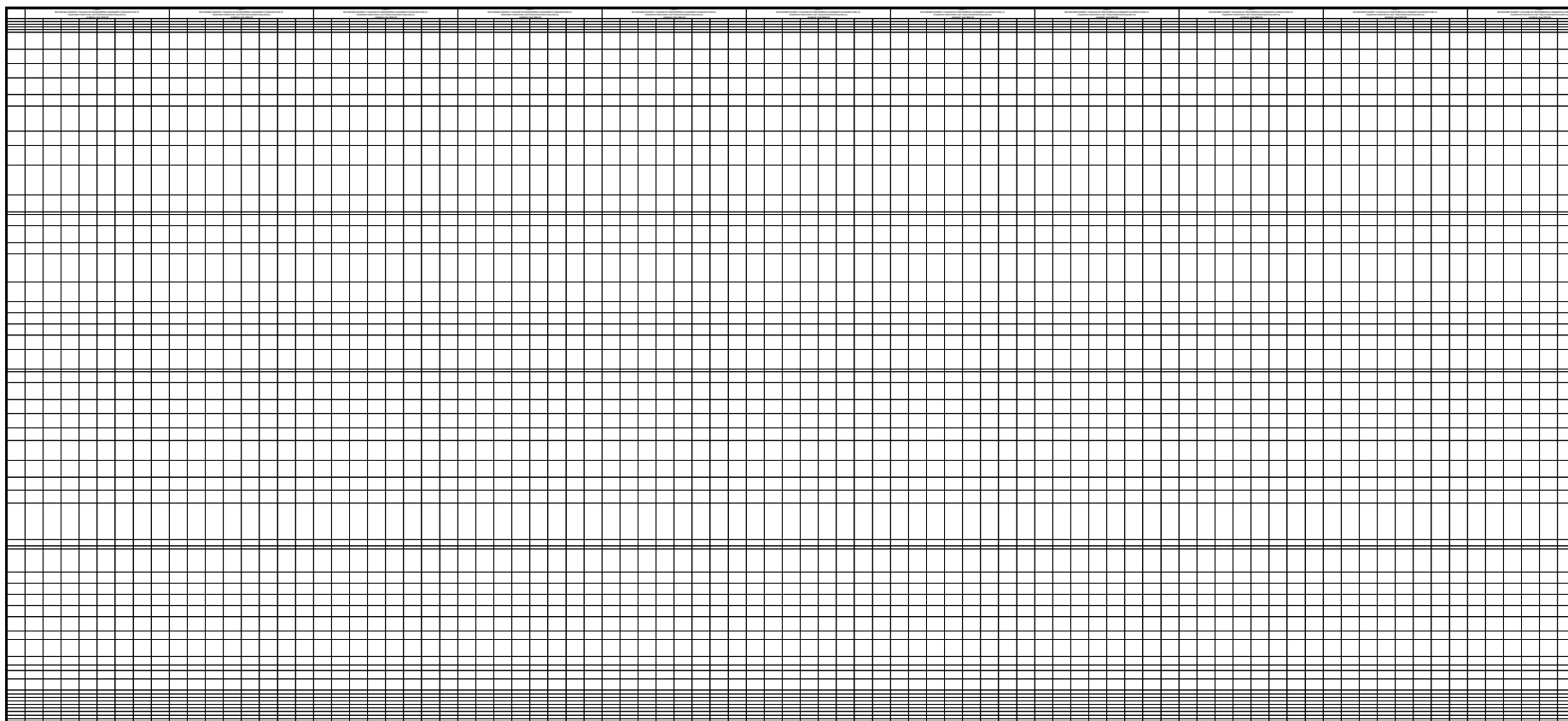


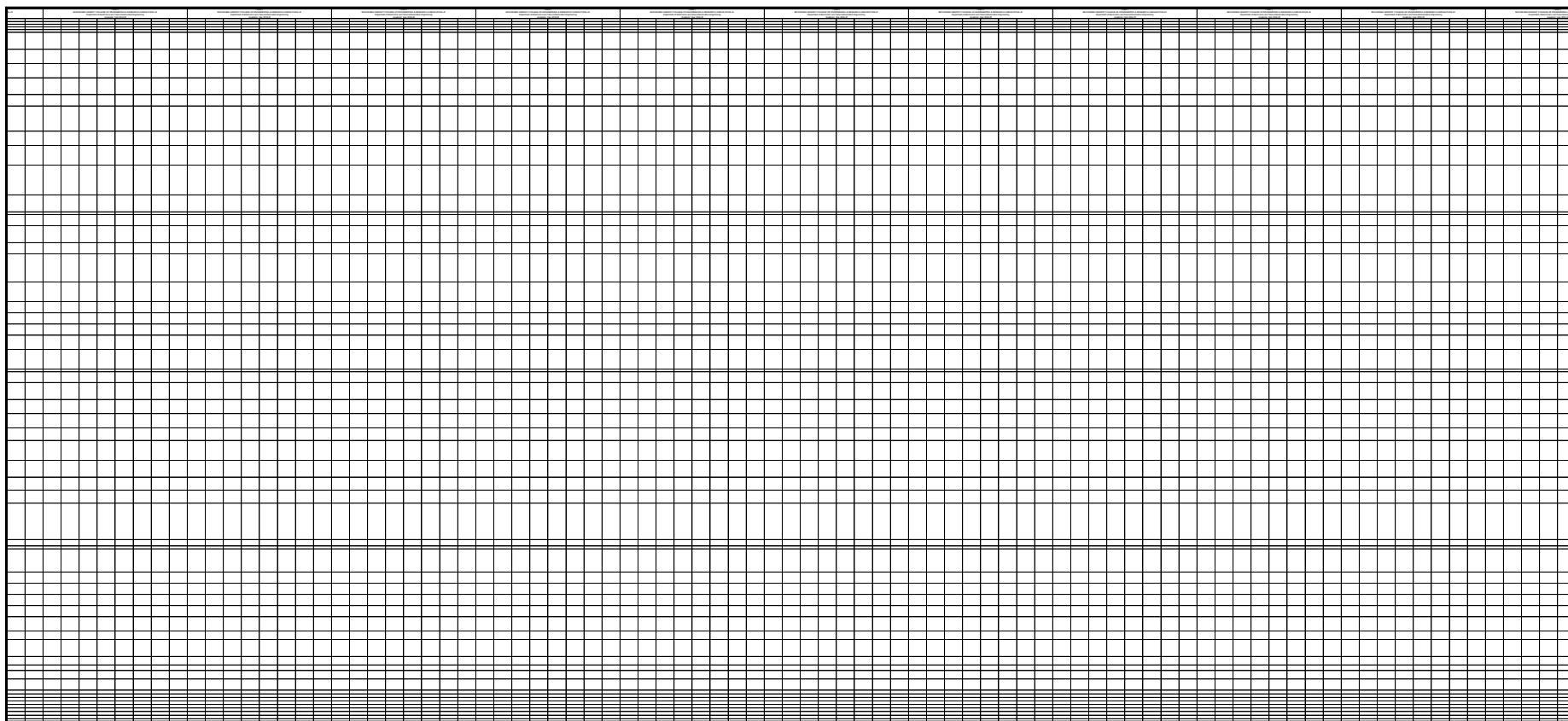


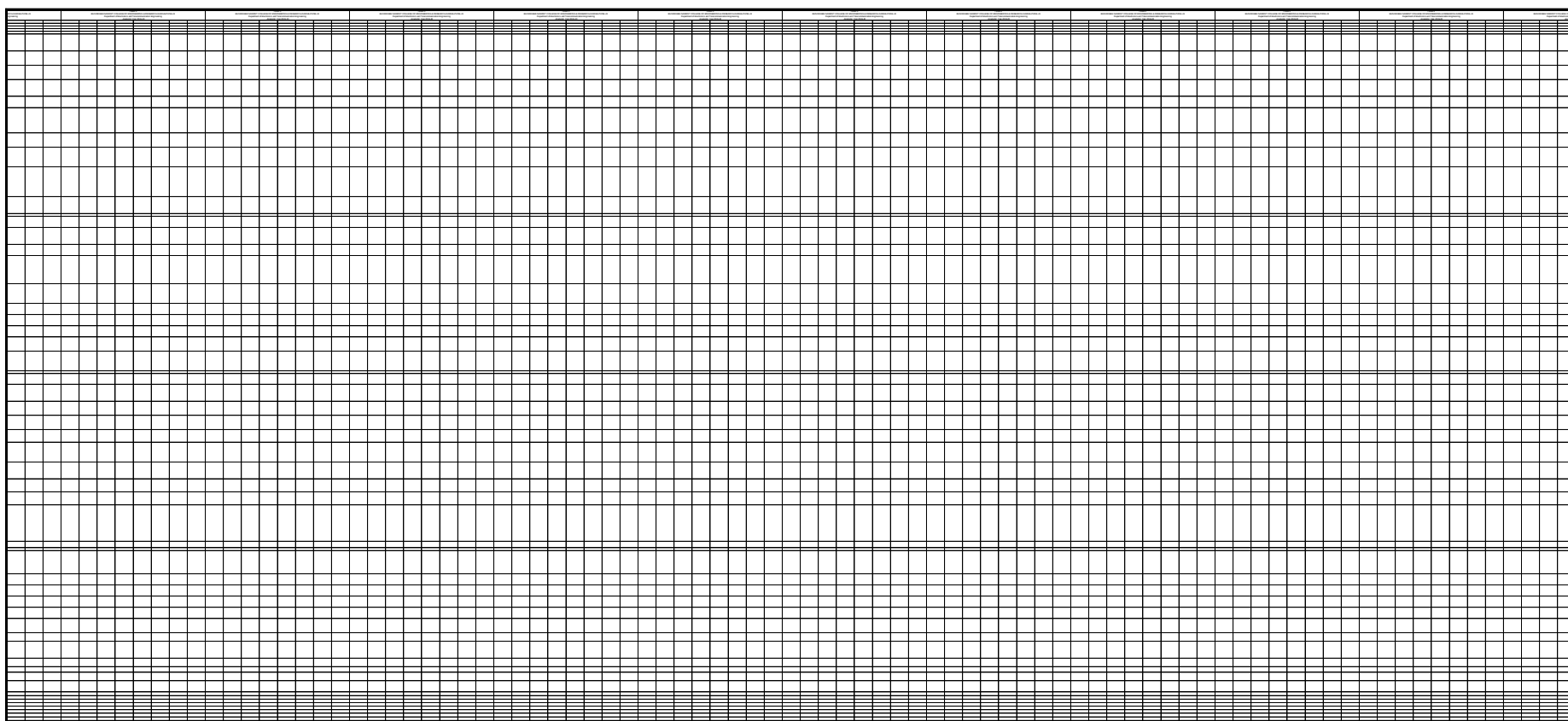


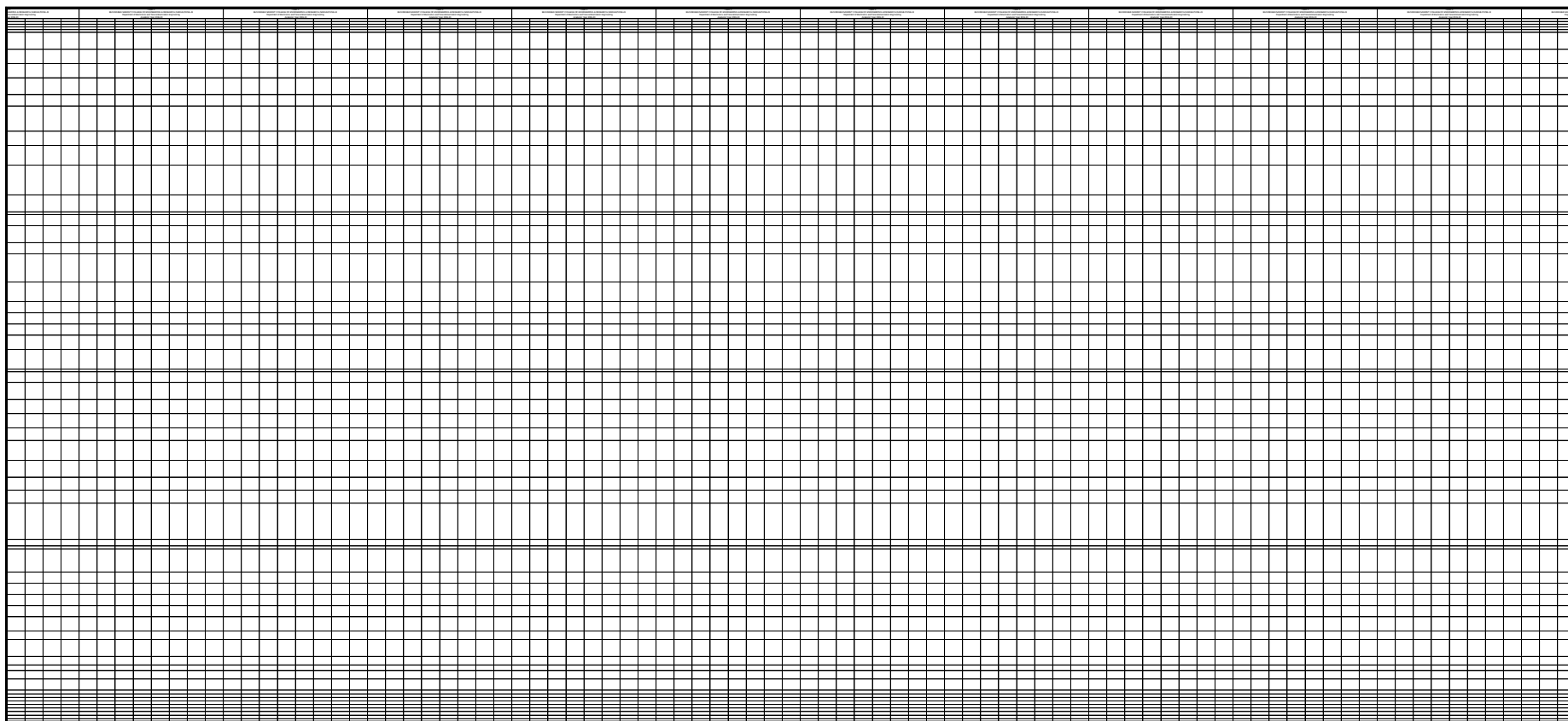
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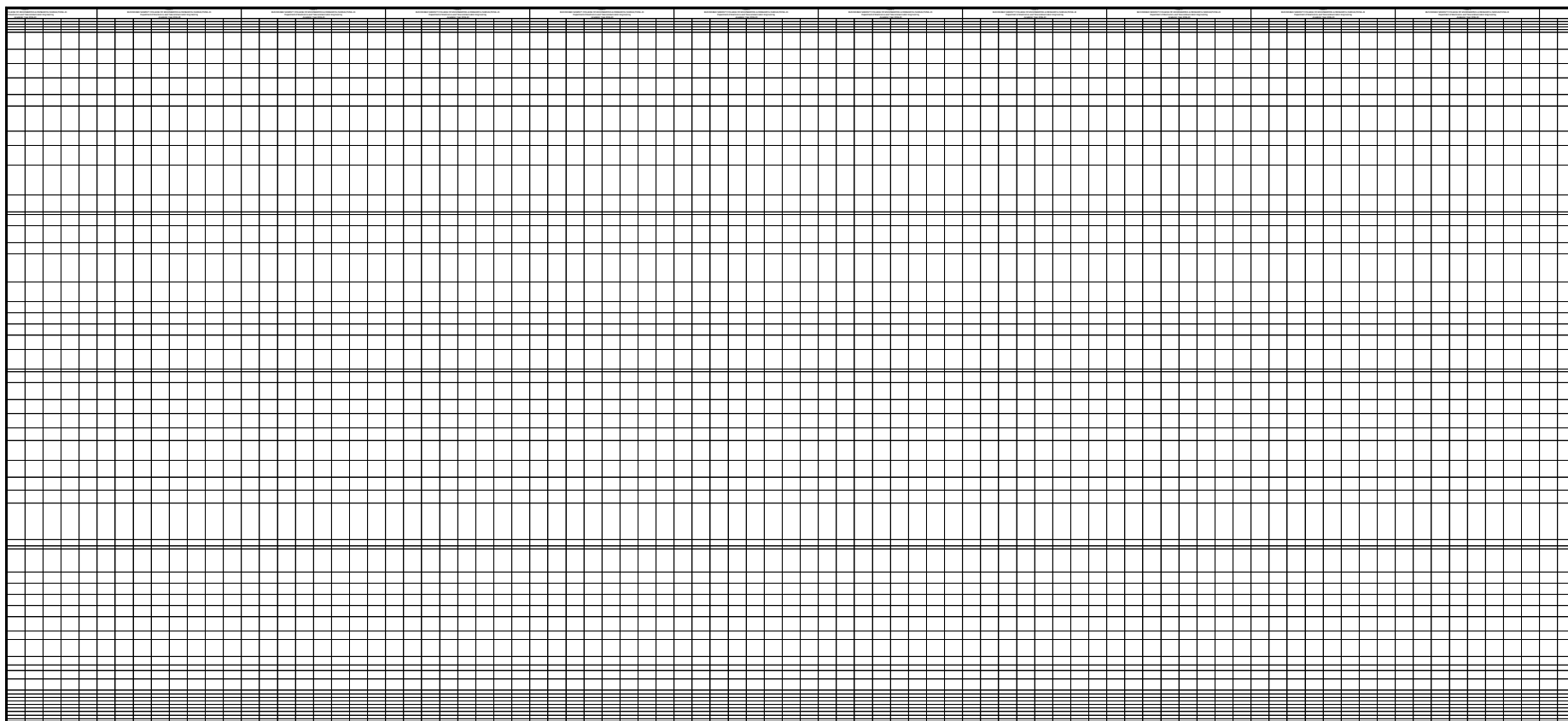


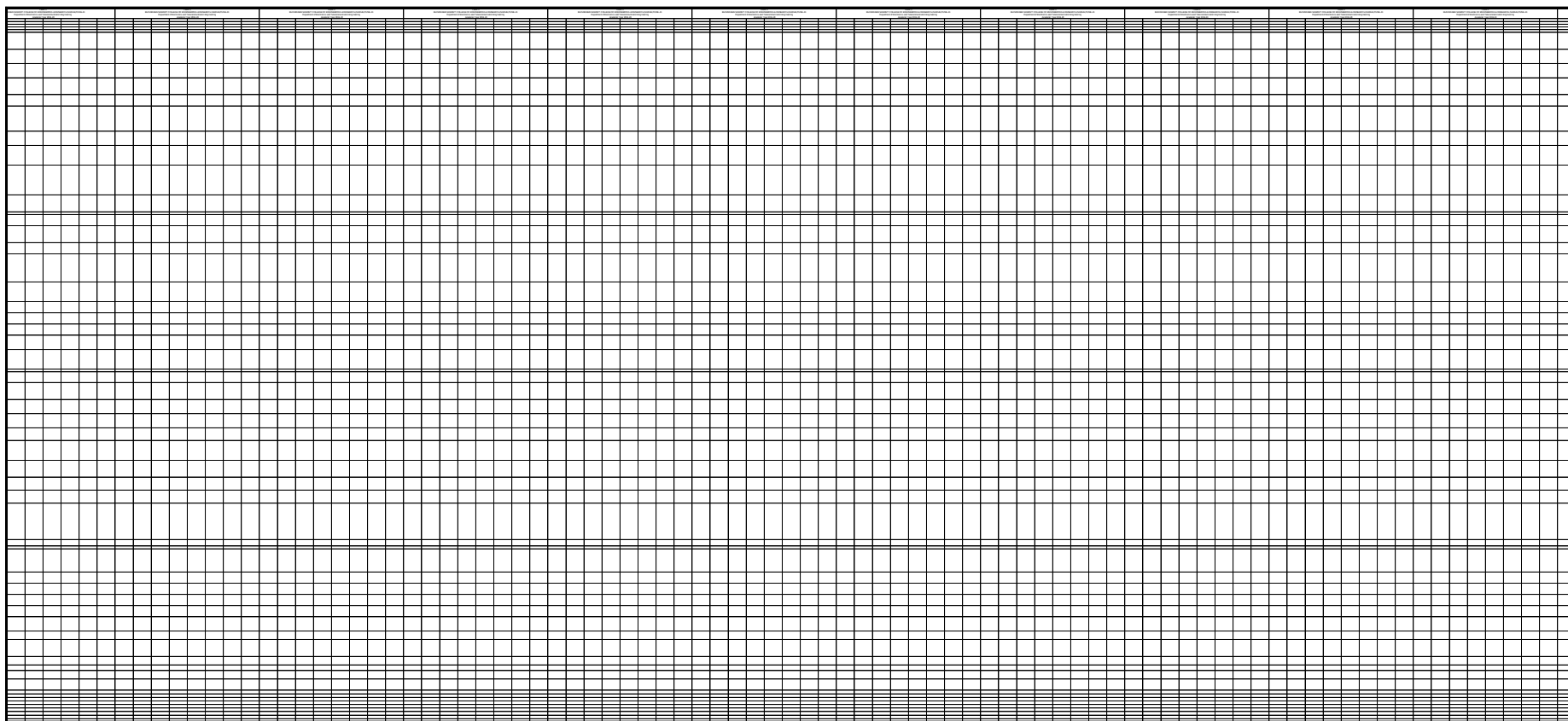




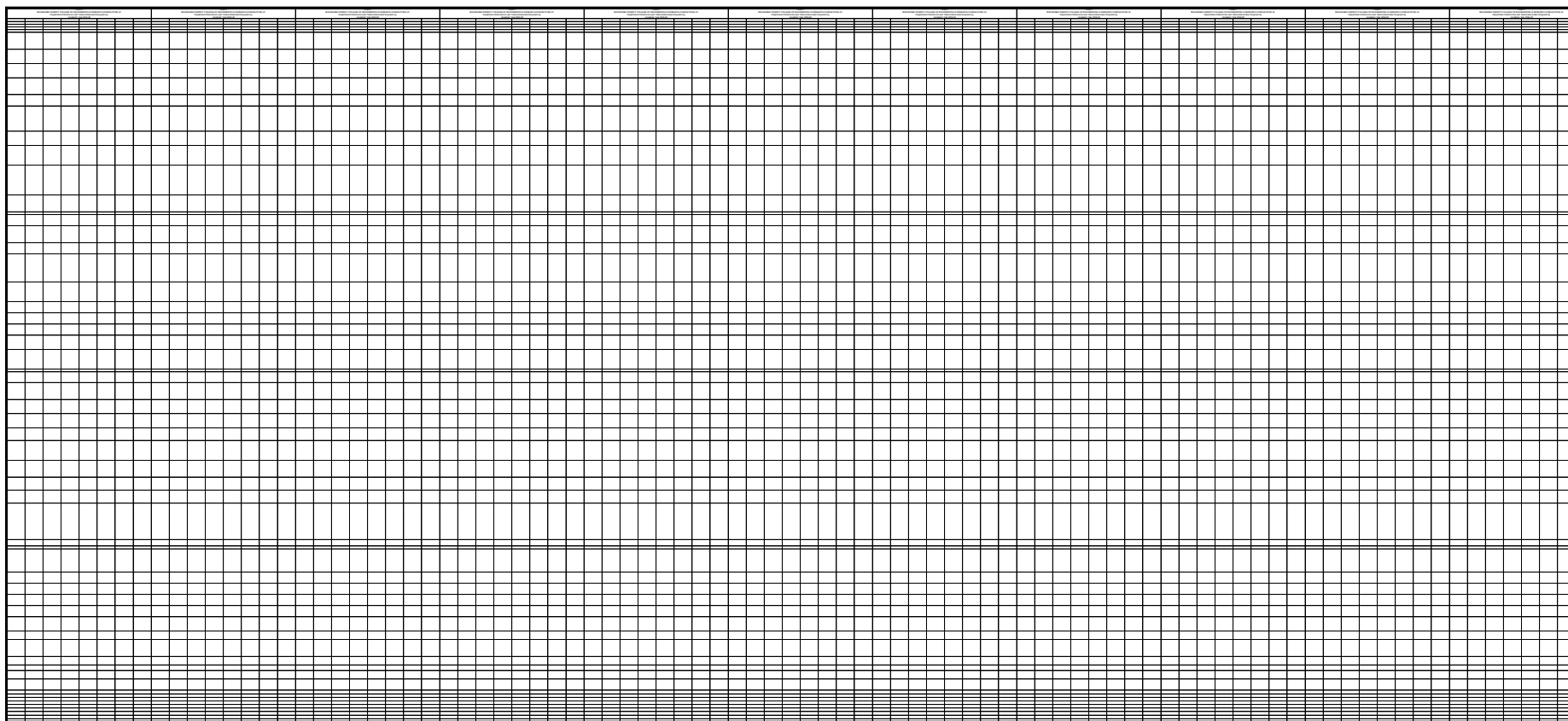


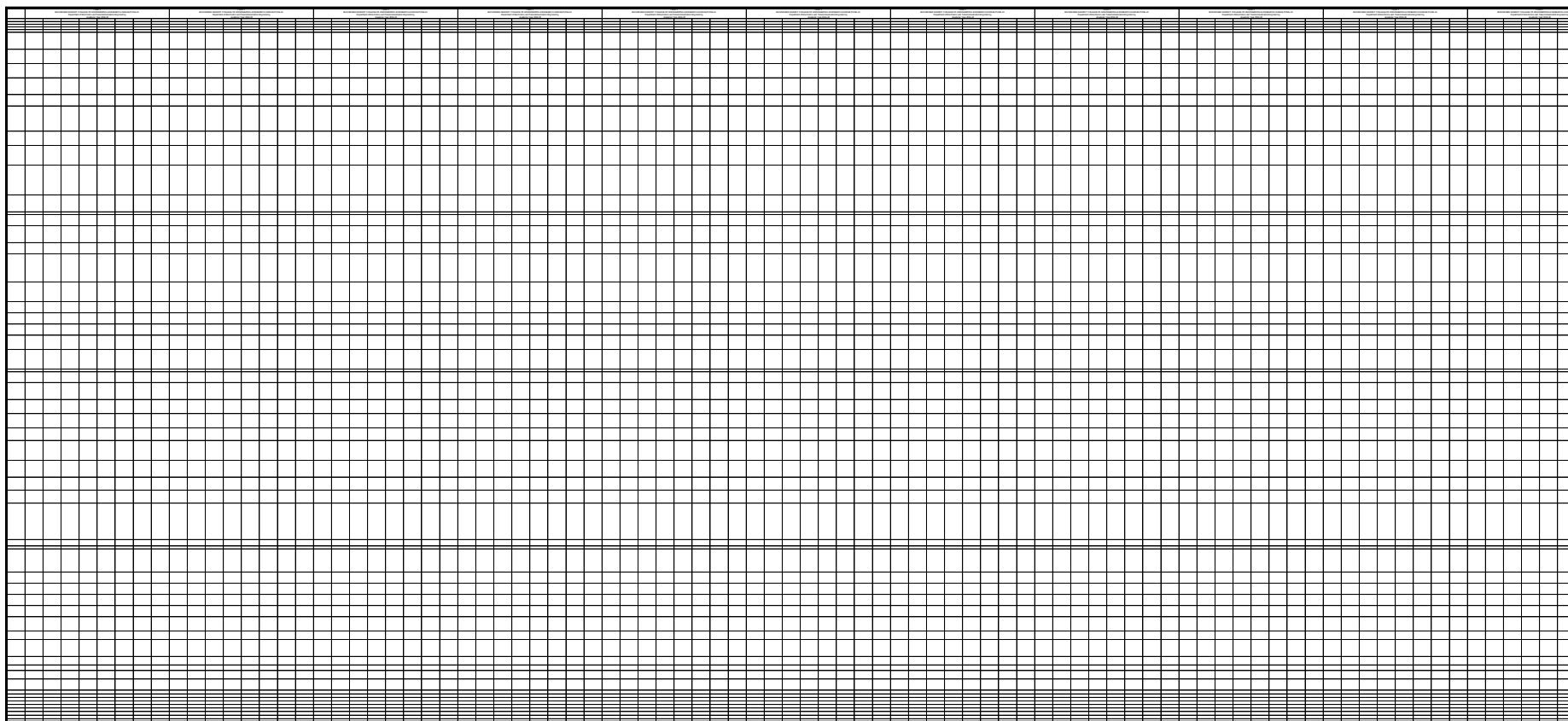


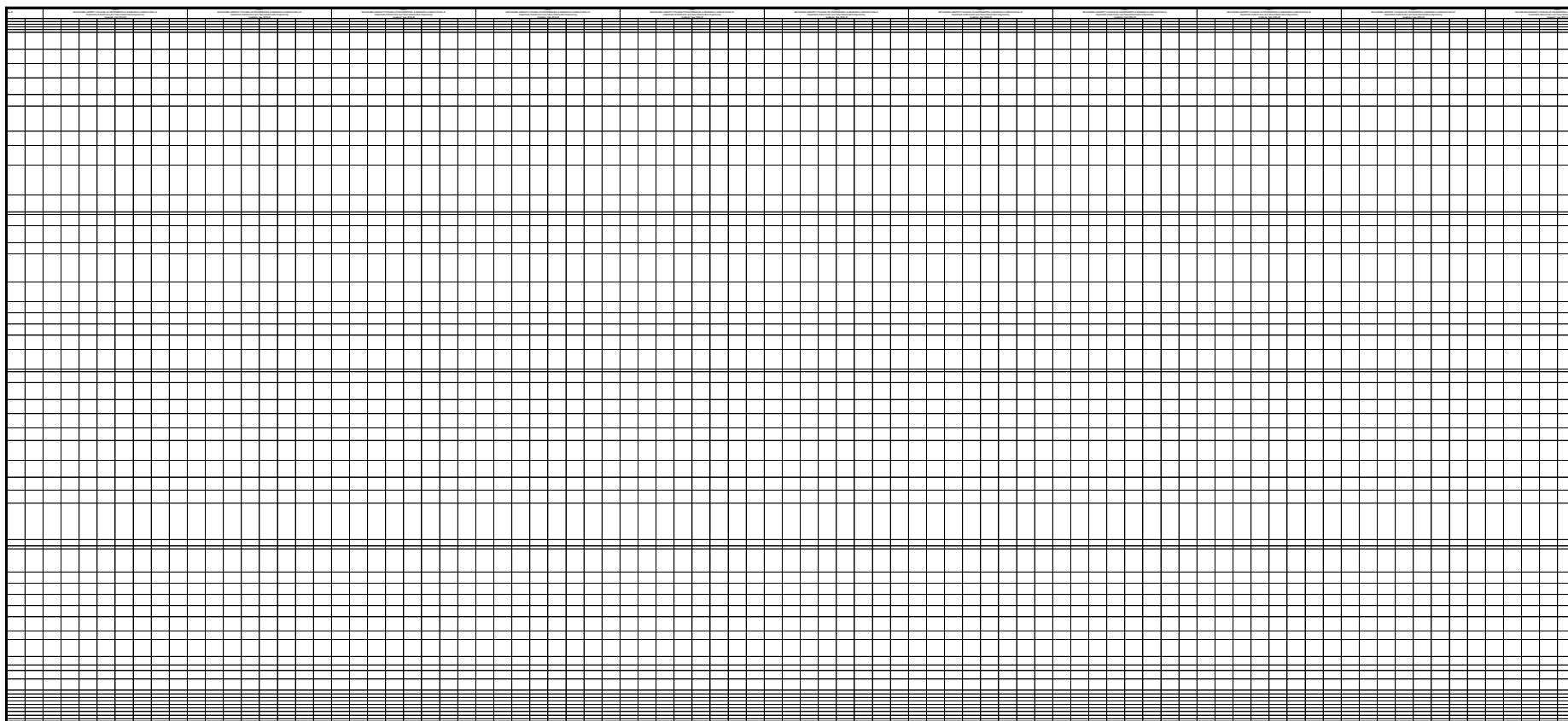


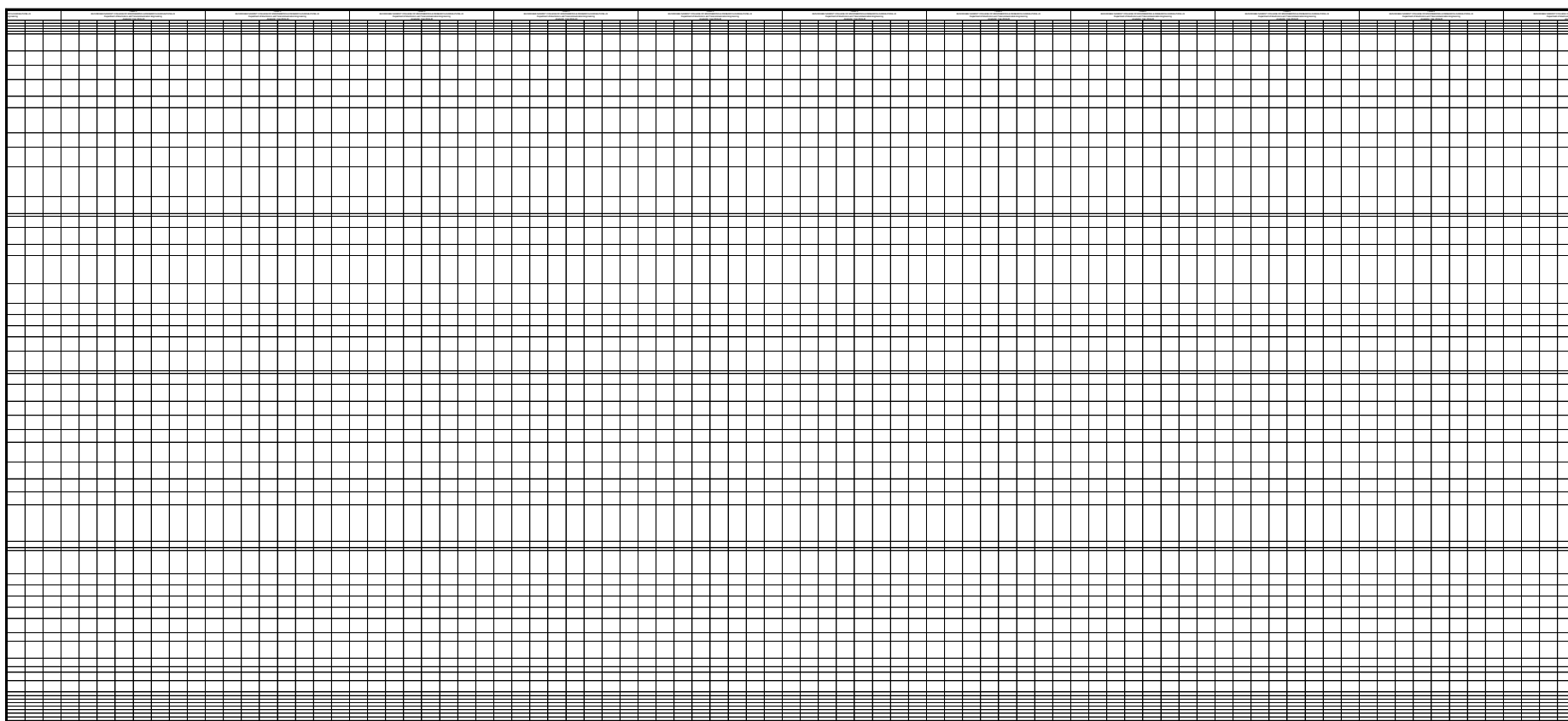


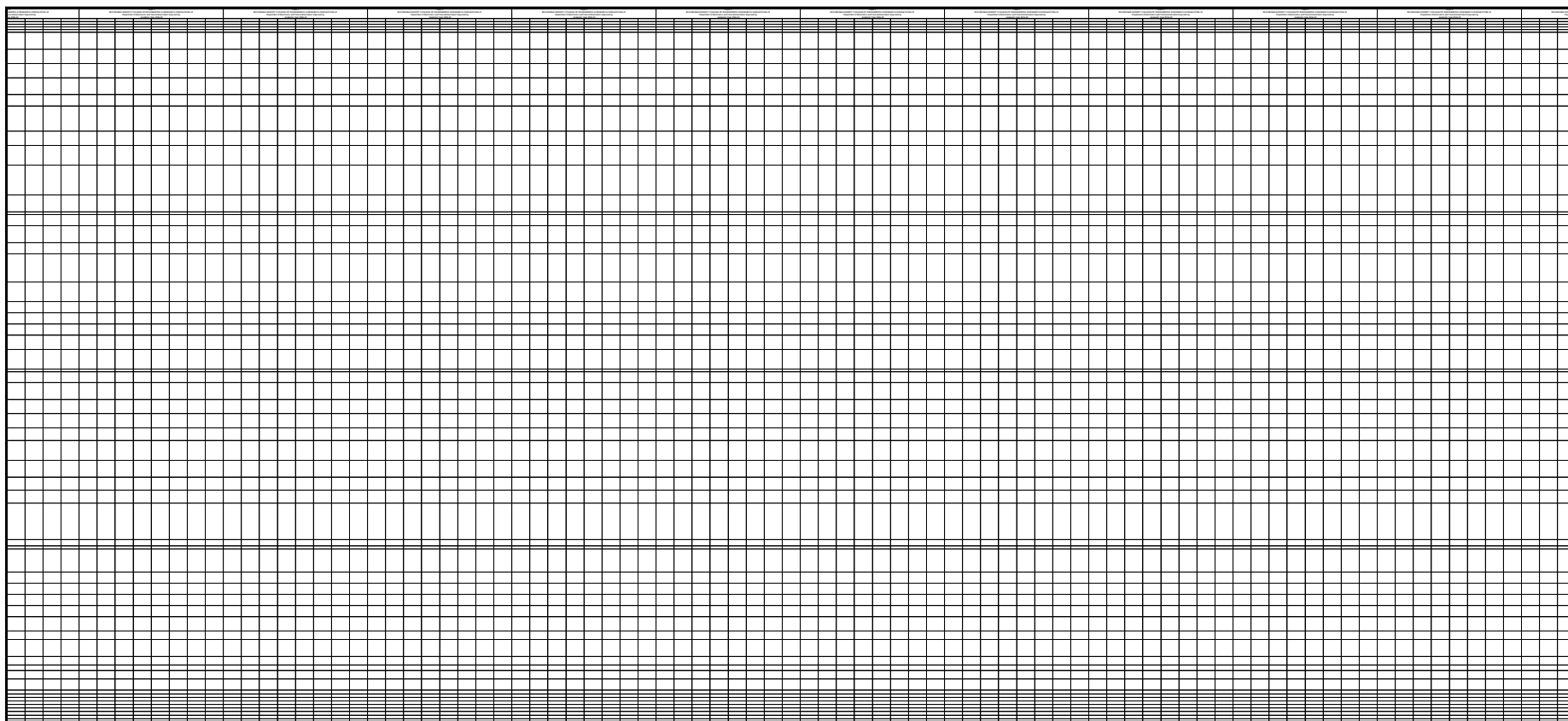
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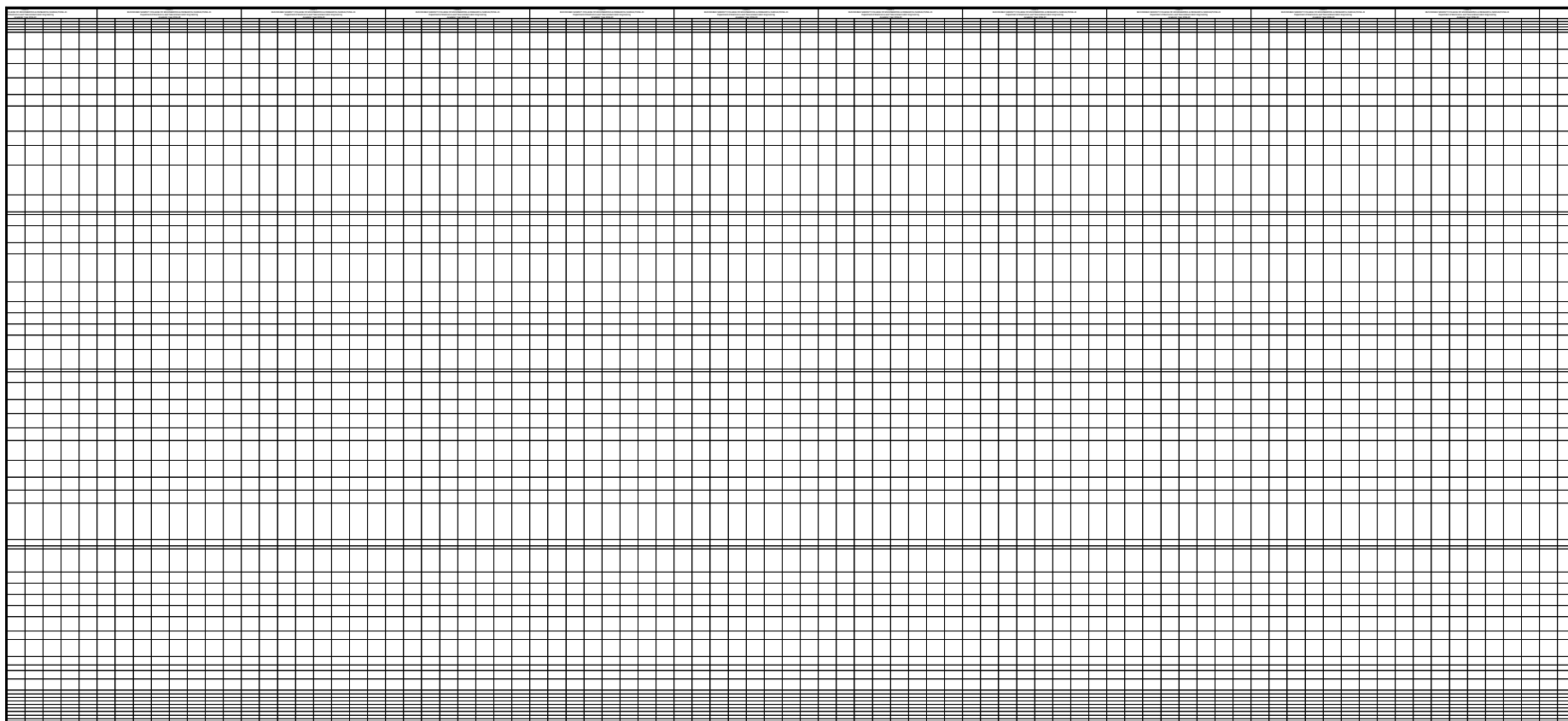


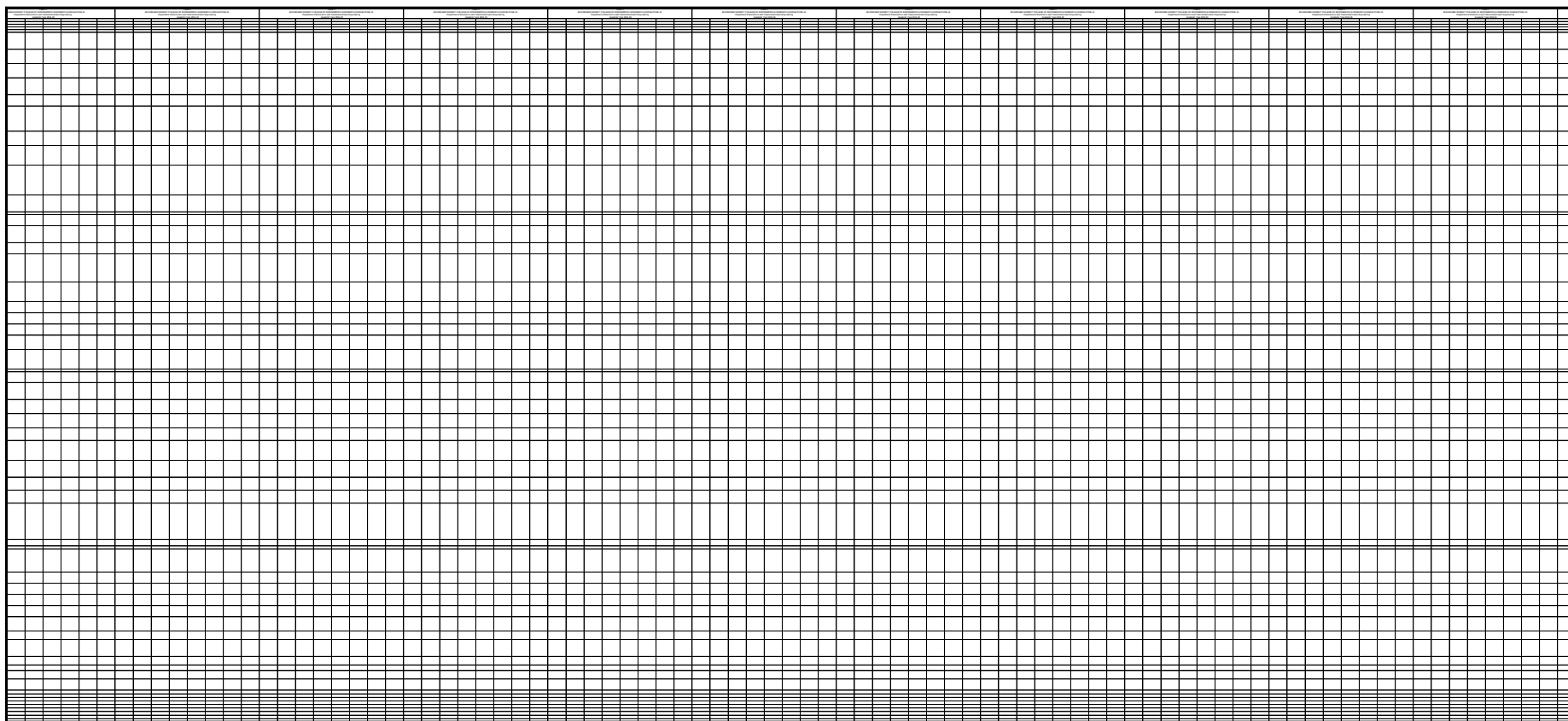












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Branch	Year & Pattern	Subject code	Subject
SE	SE 2015	204181	Signals & Systems
SE	SE 2015	204182	Electronic Devices & Circuits
SE	SE 2015	204183	Electrical Circuits and Machines
SE	SE 2015	204184	Data Structures and Algorithms
SE	SE 2015	204185	Digital Electronics
SE	SE 2015	204186	Electronic Measuring Instruments & Tools
SE	SE 2015	207005	Engineering Mathematics III
SE	SE 2015	204187	Integrated Circuits
SE	SE 2015	204188	Control Systems
SE	SE 2015	204189	Analog Communication
SE	SE 2016	204190	Object Oriented Programming
SE	SE 2017	204191	Employability Skill Development
TE	TE 2015	304181	Digital Communication
TE	TE 2015	304182	Digital Signal Processing

TE	TE 2015	304183	Electromagnetics
TE	TE 2015	304184	Microcontrollers
TE	TE 2015	304185	Mechatronics
TE	TE 2015	304193	Electronics System Design
TE	TE 2015	304186	Power Electronics
TE	TE 2015	304187	Information Theory, Coding and Communication Networks
TE	TE 2015	304188	Business Management
TE	TE 2015	306189	Advanced Processors
TE	TE 2015	304190	System Programming and Operating Systems
TE	TE 2016	304196	Employability Skills and Mini Project
BE	BE 2015	404181	VLSI Design & Technology
BE	BE 2015	404182	Computer Networks & Security
BE	BE 2015	404183	Radiation & Microwave Techniques
BE	BE 2015	404184	Embedded Systems and RTOS
BE	BE 2015	404185	Electronic Product Design
BE	BE 2015	404188	Project Stage I
BE	BE 2015	404189	Mobile Communication
BE	BE 2015	404190	Broadband Communication Systems

BE	BE 2015	404191	Audio and Speech Processing
BE	BE 2015	404192	Wireless Sensor Networks
ME	ME 2017	504401	Mathematics for Signal Processing
ME	ME 2018	504402	Image and Video Processing
ME	ME 2019	504403	Advanced Digital Signal Processing
ME	ME 2020	504404	Research Methodology
ME	ME 2021	504405	Mixed-Signal Processing
ME	ME 2022	504407	Biomedical Signal Processing
ME	ME 2023	504408	Speech Processing
ME	ME 2024	504409	Computer Vision
ME	ME 2025	504410	Biometrics (Elective II)
ME	ME 2026	604401	Statistical Signal Processing
ME	ME 2027	604402	Still Image and Video Compression

CO1

Understand mathematical description and representation of continuous and discrete time signals and systems

Comply and verify parameters after exciting devices by any stated method.

Analyze basic AC & DC circuit for voltage, current and power by using KVL, KCL, and network theorems.

Discuss the computational efficiency of the principal algorithms such as sorting &

Use the basic logic gates and various reduction techniques of digital logic circuit in detail.

Understand fundamental of various electrical measurements.

Solve higher order linear differential equation using appropriate techniques for modeling and analyzing electrical circuits.

Understand the characteristics of IC and Op-Amp and identify the internal structure.

Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.

Select & analyze various modulation schemes and components.

Describe the principles of object oriented programming.

To develop analytical abilities

Understand working of waveform coding techniques and analyse their performance.

Analyze the discrete time signals and system using different transform domain techniques.

Understand the basic mathematical concepts related to electromagnetic vector fields.
Learn importance of microcontroller in designing embedded application.
1 Identification of key elements of mechatronics system and its representation in terms of block diagram 2
Apply the fundamental concepts and working principles of electronics devices to design electronics systems.
Design & implement a triggering / gate drive circuit for a power device
Perform information theoretic analysis of communication system.
Get overview of Management Science aspects useful in business.
Describe the ARM microprocessor architectures and its feature.
Demonstrate the knowledge of Systems Programming and Operating Systems
Understand, plan and execute a Mini Project with team.
Write effective HDL coding for digital design.
Understand fundamental underlying principles of computer networking
Differentiate various performance parameters of radiating elements.
Understand design of embedded system
Understand various stages of hardware, software and PCB design.
Apply the concepts of switching technique and traffic engineering to design multistage networks.
Perform Link power budget and Rise Time Budget by proper selection of components and check its viability.

Design and implement algorithms for processing speech and audio signals considering the properties of acoustic signals and human hearing.
Explain various concepts and terminologies used in WSN
Solve systems of linear equations using multiple methods
Analyze and solve problems in image enhancement, compression and segmentation
apply the concept of Multirate Signal Processing.
The student will learn research problem & its scope, objectives, and errors.
design data conversion circuits with minimizing switching and phase noise, and jitter.
The students will be acquainted to various bio signals and methods of capturing them.
apply signal processing concepts for extracting features of speech signal.
have understanding of image formation and working of camera as image sensor, camera parameters and calibration.
Analyze the characteristics of physiological and behavioural biometrics
Use appropriate methods for signal modelling.
Overview of compression standards like JPEG 2000, MPEG1, MPEG2



CO2

Develop input output relationship for linear shift invariant system and understand the convolution operator for continuous and discrete time system
Student will implement circuit and test the performance.
Design and analyze transformers
Write and understand the programs that use arrays & pointers in C
Design combinational and sequential circuits.
Understand and describe specifications, features and capabilities of electronic instruments.
Solve problems related to Laplace transform, Fourier transform, Z-Transform and applications to Signal processing and Control systems.
Understand and identify various manufacturing techniques.
Determine the (absolute) stability of a closed loop control system
Compare & contrast strength & weaknesses of various communication systems
Apply the concepts of data encapsulation, inheritance in C++.
To develop communication skills
Analyze the performance of a baseband and pass band digital communication system in terms of error rate and spectral efficiency.
Design and implement LTI filters for filtering different real world signals.

Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.
Learn use of hardware and software tools.
Understanding basic principal of Sensors and Transducer.
Shall be able to interpret datasheets and thus select appropriate components and devices
Understand, perform & analyze different controlled converters.
Design a data compression scheme using suitable source coding technique.
Get motivation for Entrepreneurship
Interface the advanced peripherals to ARM based microcontroller
Formulate the Problem and develop the solution for same.
Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
Apply knowledge of real time issues in digital design.
Describe and analyze the hardware, software, components of a network and their interrelations.
Analyze various radiating elements and arrays.
Use RTOS in embedded application
Importance of product test & test specifications.
Differentiate thoroughly the generations of mobile technologies.
Perform Satellite Link design for Up Link and Down Link.

Analyze speech signal to extract the characteristic of vocal tract (formants) and vocal cords (pitch).
Describe importance and use of radio communication and link management in WSN
Demonstrate understanding of the concepts of vector space and subspace.
Design and integrate image processing components to satisfy given requirement of a application.
use Adaptive filtering for real life applications.
The student will learn the basic instrumentation schemes & data collection methods.
understand concept of switched capacitor circuits.
They will be able to model the biomedical systems and will be able to analyze ECG signals captured under different conditions.
use various algorithms for speech coding and enhancement
pursue knowledge of stereo imaging, its applications and challenges
Integrating the different biometrics at different fusion level to form Multi-modal biometric system.
Compute linear prediction coefficients in efficient manner.
Gain knowledge of features of various compression standards.

CO3
SE Sem I&II
Understand and resolve the signals in frequency domain using Fourier series and Fourier transforms
Student can analyze small signal model of FET and MOSFET.
Explain the working principle of different electrical machines
Describe how arrays, records, linked structures are represented in memory and use them in algorithms.
Design and implement hardware circuit to test performance and application.
Finalize the specifications of instrument and select an appropriate instrument for given measurement.
Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields
Derive and determine various performances based parameters and their significance for Op-Amp.
Perform time domain and frequency domain analysis of control system for stability analysis
Performance analysis of analog communication systems in the presence of noise.
Understand basic program constructs in Java
To introduce the students to skills necessary for getting, keeping and being successful in a profession.
Perform the time and frequency domain analysis of the signals in a digital communication system.
Develop different signal processing applications using DSP processor.

Apply the principles of magnetostatics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.
Develop interfacing to real world devices.
Able to prepare case study of the system given.
Select appropriate transducer and signal conditioning circuit to design prototype of Data Acquisition system.
Evaluate battery backup time & design a battery charger.
Design a channel coding scheme for a communication system.
Get Quality Aspects for Systematically Running the Business
Design embedded system with available resources.
Compare and analyse the different implementation approach of system programming operating system abstractions.
Prepare a technical report based on the Mini project.
Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
Apply the knowledge of waveguide fundamentals in design of transmission lines.
Use modern architecture for embedded system
Special design considerations and importance of documentation.
Explore the architecture of GSM.

Explain various wireless standards and protocols associated with WSN
Demonstrate application of probability to real life phenomenon.
Use software simulation and design tool for practical image processing
to implement DSP algorithms on digital signal processors.
The student will study the various statistical techniques.
analyze and design switched capacitor circuits like amplifiers, integrators, and filters
The student will be able to implement various image processing algorithms and techniques for MRI images.
understand various applications of speech processing.
have conceptual understanding of computer vision algorithms for motion tracking
Design and analyze simple module of biometric based system
Apply Wiener filter for noise cancellation.
Develop ability to choose compression standard for the given application

CO4

Understand the limitations of Fourier transform and need for Laplace transform and develop the ability to analyze the system in s- domain.
Student can explain behavior of FET at low frequency.
Select proper electrical motor for given application.
Implement stacks & queues for various applications.
Understand the architecture and use of microcontrollers for basic operations and Simulate using simulation software.
Carry out required measurement using various instruments under different setups.
Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing.
Analyze and identify linear and nonlinear applications of Op-Amp.
Perform time domain and frequency domain correlation stability analysis
Selection of various pulse & digital modulation techniques
Apply the concepts of classes, methods and inheritance to write programs Java.
To expose the students to leadership and team-building skills.
Design of digital communication system.

Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.
Design an electronic system/sub-system and validate its performance by simulating the same.
Design & implement over voltage / over current protection circuit.
Understand and apply fundamental principles of data communication and networking.
To Develop Project Management aspect and Entrepreneurship Skills.
Use of DSP Processors and resources for signal processing applications.
Interpret various OS functions used in Linux / Ubuntu
Deliver technical seminar based on the Mini Project work carried out
Design CMOS circuits for specified applications.
Have a basic knowledge of installing and configuring networking applications.
Design and set up a system consisting of various passive microwave components.
Use Linux for embedded system development

Analyze speech signal for extracting LPC and MFCC Parameters of speech signal.
Recognize importance of localization and routing techniques used in WSN
Determine different statistical parameters of given distributions
The students will study modeling and predict the performance of experimental system.
understand concept, working, and applications of PLLs and DLL.
work with real time 3D problems based on the understanding of stereo vision techniques and algorithms
Understand techniques used in data compression.

CO5

Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event
Student can design an adjustable voltage regulator circuits.
Understand various terminologies and traversals of trees and use them for various applications.
Able to compare measuring instruments for performance parameters
Understand and apply the functionalities of PLL to Frequency synthesizer, multiplier, FM, and AM demodulators
Apply root locus, frequency plot techniques to analyze control system
Fault finding and diagnosis of analog communication system.
Use arrays, vectors and strings concepts and interfaces to write programs in Java.
Understand working of spread spectrum communication system and analyze its performance

Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.
Shall be able to use an EDA tool for circuit schematic and simulation.
Apply flow and error control techniques in communication networks.
Analyze various issues and constraints in design of an ASIC
Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
Analyze tube based and solid state active devices along with their applications.
Use open platform for embedded system development

Apply the knowledge of speech and audio signal analysis to build speech processing applications like speech coding, speech recognition, speech enhancement and speaker recognition/verification.
Understand techniques of data aggregation and importance of security in WSN
The student will be able to understand various sources of distortions in biomedical signals and its remedial techniques.
apply Object tracking and Recognition techniques in real life applications like Surveillance ,Security and industry.

CO6	CO7	
Understand various terminologies and traversals of graphs and use them for various applications.		
Select appropriate instrument for the measurement of electrical parameter professionally.		
Describe and use the concepts in Java to develop user friendly program,		

Create, manage the database and query handling using suitable tools.		
Apply knowledge of testability in design and build self test circuit.		
Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.	Have a basic knowledge of the use of cryptography and network	
Measure various performance parameters of microwave components.		

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BHIVARABAI SAWANT COLLEGE OF ENGINEERING & TECHNOLOGY

Program Outcomes

1. To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic
2. To analyze the problem by finding its domain and applying domain specific skills
3. To understand the design issues of the product/software and develop effective solutions with appropriate
4. To find solutions of complex problems by conducting investigations applying suitable tech
5. To adapt the usage of modern tools and recent software.
6. To contribute towards the society by understanding the impact of Engineering on global
7. To understand environment issues and design a sustainable system.
8. To understand and follow professional ethics.
9. To function effectively as an individual and as member or leader in diverse teams and in
10. To demonstrate effective communication at various levels.
11. To apply the knowledge of Computer Engineering for development of projects, and its finance and manag
12. To keep in touch with current technologies and inculcate the practices of lifelong learning

Program Specific Outcomes

- | | |
|-------|--|
| PSO1. | Graduates will be able to describe communication technologies and its ap |
| PSO2. | Graduates will be able to analyze and process signals, design intelligent sy |
| PSO3. | Graduates will be able to apply fundamental knowledge of analog and digit |
| PSO4. | Graduates will be able to demonstrate knowledge and develop solutions to |



TSSM's
COLLEGE OF ENGINEERING & RESEARCH, NARHE, PUNE-41
Department of E&TC Engineering
Academic Year 2019-20

: analysis to solve complex engineering problems..

consideration of public health and safety, cultural, societal, and environmental issues
techniques.

aspect.

interdisciplinary settings.

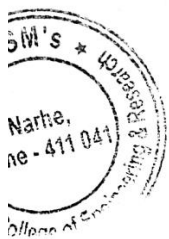
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systems and develop signal processing algorithms.

al systems to design and develop embedded systems using modern tools for providing sol
to the problems in the domains such as analog circuits, power electronics and automation v





utions to real-life problems in electronic product design.
while working as an individual as well as in a group.

Branch	Year & Pattern	Subject code	Subject
SE	SE 2015	207002	Engineering Mathematics III
SE	SE 2015	202041	Manufacturing Process-I
SE	SE 2015	202042	Computer Aided Manufacturing Process
SE	SE 2015	202043	Thermodynamics
SE	SE 2015	202044	Material science
SE	SE 2015	202051	Strength of Materials
SE	SE 2015	202045	Fluid Mechanics
SE	SE 2015	202047	Soft skills
SE	SE 2015	202048	Theory of Machines-I
SE	SE 2015	202049	Engineering Metallurgy
SE	SE 2015	202050	Applied Thermodynamics
SE	SE 2015	203152	Electrical and Electronics Engineering
TE	TE 2015	302041	Design of Machine Elements -I
TE	TE 2015	302042	Heat Transfer
TE	TE 2015	302043	Theory of Machines-II
TE	TE 2015	302044	Turbo machines
TE	TE 2015	302045	Metrology and Quality control
TE	TE 2015	302047	Numerical methods and optimization
TE	TE 2015	302048	Design of Machine Elements -II
TE	TE 2015	302049	Refrigeration and Airconditioning

TE	TE 2015	302050	Mechatronics
TE	TE 2015	302051	Manufacturing proces-II
TE	TE 2015	302052	Machine shop-II
TE	TE 2015	302053	Seminar
BE	BE 2015	402041	Hydraulic and Pneumatics
BE	BE 2015	402042	CAD CAM Automation
BE	BE 2015	402043	Dynamics of Machinery
BE	BE 2015	402045A	Automobile Engineering
BE	BE 2015	402044 A	Finite Element Analysis
BE	BE 2015	402046	Project - I
BE	BE 2015	402047	Energy Engineering
BE	BE 2015	402048	Mechanical System Design
BE	BE 2015	402049B	Industrial Engineering
BE	BE 2015	402050 A	Advanced manufacturing process
BE	BE 2015	402051	Project-II
ME	ME 2017	507201	Advance Mathematics
ME	ME 2017	502202	Material Science and Mechanical Behavior of Material.
ME	ME 2017	502203	Advance Stress Analysis
ME	ME 2017	502104	Research Methodology
ME	ME 2017	502205	Elective-1

ME	ME 2017	502207	Analysis and Synthesis of Mechanisms
ME	ME 2017	502208	Advanced Mechanical Vibrations
ME	ME 2017	502209	Finite Element Method
ME	ME 2017	502210	Elective II
ME	ME 2017	602213	Optimization Techniques
ME	ME 2017	602214	Mechanical Measurements and Controls
ME	ME 2017	602215	Elective III

CO1
Solve higher order linear differential equations and apply to modeling and analyzing mass spring system
Understand and analyze foundry practices like pattern making, mold making, Core making and Inspection of defects.
Understand the importance of CAD in the light of allied technologies such as CAM, CAE, FEA, etc
• Apply various laws of thermodynamics to various processes and real systems.
Understand the basic concepts and properties of Material.
Apply knowledge of mathematics, science for engineering applications
various properties in solving the problems in fluids
• Improved communication, interaction and presentation of ideas.
• Identify mechanisms in real life applications.
• describe how metals and alloys formed and how the properties change due to microstructure
• Classify various types of Engines, Compare Air standard, Fuel Air and Actual cycles
Develop the capability to identify and select suitable DC motor / induction motor
TE SEM I & II
Ability to identify and understand failure modes for mechanical elements and design of machine elements based on strength.
Analyze the various modes of heat transfer and implement the basic heat conduction equations for steady one dimensional thermal system
Student will be able to understand fundamentals of gear theory which will be the prerequisite for gear design.
Apply thermodynamics and kinematics principles to turbo machines
Understand the methods of measurement, selection of measuring instruments / standards of measurement, carryout data collection and its analysis.
use appropriate numerical methods to solve complex mechanical engineering problems
To understand and apply principles of gear design to spur gear and industrial spur gear boxes
Learning the fundamental principles and different methods of refrigeration and air conditioning

Identification of key elements of mechatronics system and its representation in terms of block diagram
Able to apply the knowledge of various manufacturing processes
Ability to develop knowledge about the working and programming techniques for various machines and tools
Establish motivation for any topic of interest and develop a thought process for technical presentation
BE SEM I & II
Understand working principle of components used in hydraulic & pneumatic systems
Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations.
Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
To compare and select the proper automotive system for the vehicle
Understand the different techniques used to solve mechanical engineering problems.
Find out the gap between existing mechanical systems and develop new creative new mechanical systems
Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
Understand the difference between component level design and system level design.
Apply the Industrial Engineering concept
Classify and analyze special forming processes
i. Students develop an in-depth knowledge of numerical methods applicable for mechanical engineering
Improve the understanding of Materials Science and Engineering.
1. To introduce to students the concept of three dimensional stress and strain at a point as well stress-strain relationships for isotropic materials
Understand some basic concepts of research and its methodologies
The course will enable the students to develop a project in actual life.

1 To have the confidence to analyze Simple and Complex Mechanisms
Understand the concepts of vibration modes and natural frequencies and their measurement and estimation for multi-degree-of-freedom systems;
Understand the concepts behind vibrational methods and weighted residual methods in FEM
1. The course will enable the students to explain the mechanical behaviour of layered composites compared to isotropic materials.
1. Describe clearly a problem, identify its parts and analyze the individual functions of classical Optimization Techniques.
Identify and select proper measuring instrument for specific application
The course will enable the students to know the importance of Tribology in Industry.

CO2
Apply Laplace transform and Fourier transform techniques to solve differential equations involved in vibration theory, Heat transfer and related engineering theory
Understand and analyze Hot and Cold Working, Rolling, Forging, Extrusion and Drawing Processes
Understand the significance of parametric technology and its application in 2D sketching
• Apply the concept of Entropy, Calculate heat, work and other important thermodynamic properties for various ideal gas processes.
Understand about material fundamental and processing.
Design and conduct experiments, as well as to analyze and interpret data
Use of Bernoulli's equation for solutions in fluids
• Right attitudinal and behavioural change
• Perform kinematic analysis of simple mechanisms.
• apply core concepts in Engineering Metallurgy to solve engineering problems.
• Understand Theory of Carburetion, Modern Carburetor, Stages of Combustion in S. I. engines
Program Arduino IDE using conditional statements
Ability to design Shafts, Keys and Coupling for industrial applications.
Implement the general heat conduction equation to thermal systems with and without internal heat generation and transient heat conduction
Student will be able to perform force analysis of Spur, Helical, Bevel, Worm and Worm gear.
Analyze the performance of thermodynamics
Explain tolerance, limits of size, fits, geometric and position tolerances and gauge design
formulate algorithm and programming
To become proefficient in design of Bevel and Hellical gears
Study of various refrigeration cycles and evaluate performance using Mollier charts and/ or refrigerant property tables.

Understanding the concept of signal processing and use of interfacing systems such as ADC, DAC, digital I/O
Able to identify various process parameters and their effect on various processes
Organize a detailed literature survey build a document with respect to technical publications
Identify various applications of hydraulic & pneumatic systems
Use analytical and synthetic curves and surfaces in part modeling.
Estimate natural frequency for single DOF undamped & damped free vibratory systems.
To analyse the performance of the vehicle
Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses.
Learn about the literature review
Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems etc for the specifications stated/formulated
Understand, analyze and implement different concepts involved in method study.
Analyze and identify applicability of advanced joining processes
ME DESIGN SEM-I, II AND III
ii. Students develop the ability to formulate and to obtain the numerical solution of mechanical engineering problems
Application of techniques in the area of Materials Science and Engineering
2. To introduce to students the method of calculation of stresses in components of noncircular cross section subjected to unsymmetrical bending and torsional loading.
Identify appropriate research topics
The course will enable the students to take Challenges, Opportunities in operation management.

Ability to apply kinematic theories to real-world problems of mechanism design and synthesis
Have an in-depth understanding of System Modelling via use of Energy Analysis and its application to complex vibrating systems;
Identify the application and Characteristics of FEA elements such as bars, beams plane and isoperimetric elements, 3D Elements
1. The course will enable the students to apply constitutive equations of composite materials and understand mechanical behaviour at micro and macro levels
2. Feasibility study for solving an optimization problem.
Illustrate working principle of measuring instruments and to identify error in measuring Instrument.
The course will enable the students to know the basic concepts of Friction, Wear, Lubrications and their measurements.

CO3
Apply statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control
Understand different plastic molding processes, Extrusion of Plastic and Thermoforming
Understand the significance of parametric feature-based modeling and its application in 3D machine components
• Estimate performance of various Thermodynamic gas power cycles and gas refrigeration cycle and availability in each case.
Select proper metal, alloys, nonmetal and powder metallurgical component for specific requirement .
Design a component to meet desired needs within realistic constraints of health and safety
Determination of forces drag and lift on immersed bodies
• Developed right-attitudinal and behavioral change
• Perform static and dynamic force analysis of slider crank mechanism.
• conduct experiments, as well as to analyze and interpret data
• Understand Fuel Supply system, Types of Injectors and Injection Pumps, Stages of combustion in CI engines
Interfacing sensors with Arduino IDE
Ability to design machine elements subjected to fluctuating loads.
Analyze the heat transfer rate in natural and forced convection and evaluate through experimentation investigation
The student to analyze speed and torque in epi-cyclic gear trains which will be the prerequisite for gear box design.
ability to select turbo machine for given application
Understand and use/apply Quality Control Techniques/ Statistical Tools appropriately.
use mathematical solver
To learn a skill to design a worm gear box for various industrial technical applications
Comparative study of different refrigerants with respect to properties, applications and environmental issues.

Interfacing of Sensors, Actuators using appropriate DAQ micro-controller
Able to figure out application of modern machining
Analysis and comprehension of proof-of -concept and data
Selection of appropriate components required for hydraulic and pneumatic systems
Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
To diagnose the faults of automobile vehicles
Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
Get the experience to handle various tools, tackles and machines.
Recognize the layout, component details of hydroelectric power plant and nuclear power plant
Learn optimum design principles and apply it to mechanical components.
Design and Develop different aspects of work system and facilities.
Understand and analyze the basic mechanisms of hybrid non-conventional machining
iii. Students will be able to compare different numerical schemes
Improve the existing knowledge and understanding.
3. To introduce to students the method of calculation of shear stress in thin walled sections and determination of shear center.
Select and define appropriate research problem and parameters.
The course will enable the students Excellence, risk management and sustainability, Case studies.

To understand the Kinematics of Spatial Mechanisms
Have an understanding of vibration analysis concepts and experimental techniques including modal analysis;
Develop element characteristics equation procedure and generation of global stiffness equation will be applied
1. Students will demonstrate the ability to assess the suitability of a given noise environment to accepted usage practices.
3. Becoming a mathematical translation of the verbal formulation of an optimization problem.
Explain calibration methodology and error analysis related to measuring instruments
This course will help students to know the performance of different types of bearings and analytical analysis thereof.

CO4
Perform vector differentiation and integration, analyze the vector fields and apply to fluid flow problems
Understand different Welding and joining processes and its defects
Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.
• Estimate the condition of steam and performance of vapour power cycle and vapour compression cycle.
Detect the defects in crystal and its effect on crystal properties.
Identify, formulate, and solve engineering problems
NA
• Determine moment of inertia of rigid bodies experimentally.
• select materials for design and construction.
• Carry out Testing of I. C. Engines and analyze its performance.
Ability to design Power Screws for various applications.
Interpret heat transfer by radiation between objects with simple geometries
Student will be able to design cam profile for given follower motions and understand cam Jump phenomenon, advance cam curves
predict performance of turbomachines using model analysis
Develop an ability of problem solving and decision making by identifying and analyzing the cause for variation and recommend suitable corrective actions for quality improvement
generate solutions for real life problems using optimization techniques
To inculcate an ability to design belt drives and selection of belts , rope and chain drive
Understand the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.

Time and Frequency domain analysis of system model (for control application)
Get the knowledge of jigs and fixtures for variety of operations
Effective presentation and improve soft skills
Analyze hydraulic and pneumatic systems for industrial/mobile applications
Generate CNC program for Turning / Milling and generate tool path using CAM software.
Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
To apply the knowledge of EVs
Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
Handle system level projects from concept to product.
Understand and Apply Industrial safety standards, financial management practices.
Select appropriate micro and nano fabrication techniques for engineering applications
iv. Students will be able to understand the algorithms of mechanical engineering related software packages
Application of Mathematical, Scientific and Engineering techniques to study the behaviour of material.
4. To introduce to students the method of calculation of stresses and strains associated with thick wall cylindrical pressure vessels and rotating disks
Understand and apply research approaches, techniques and strategies in the appropriate manner for decision making.
Understand the core features of the operations and production management function at the operational and strategic levels.

Ability to develop analytical competency in solving problems on synthesis of Planar Mechanisms.
Be familiar with the use of different numerical techniques and its application to vibration design;
Apply suitable boundary condition to a global structural equation, and reduce it to a solvable form 1D and 2D element
1. Students will demonstrate knowledge of the basic instruments used to experimentally characterize acoustics fields.
4. To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution.
Identify and apply the derived and field quantities to measuring Instruments.
This course will help students to apply the principles of surface engineering for different applications of tribology.

CO5
Solve various partial differential equations such as wave equation, one and two dimension flow equations
Understand, Design and Analyze different sheet metal working processes
• Ability to ensure manufacturability and proper assembly of components and assemblies.
• Estimate Stoichiometric air required for combustion, performance of steam generators and natural draught requirements in boiler plants.
Evaluate the different properties of material by studying different test
Practice professional and ethical responsibility
NA
• Analyze velocity and acceleration of mechanisms by vector and graphical methods.
• possess the skills and techniques necessary for modern materials engineering practice
• Describe construction and working of various I. C. Engine systems
Ability to design fasteners and welded joints subjected to different loading conditions.
Analyze the heat transfer equipment and investigate the performance Performance.
The student will synthesize a four bar mechanism with analytical and graphical methods
NA
analyze the research problem
To achieve an expertise in design of sliding contact bearing in industrial applications
Study of the various equipment-operating principles, operating and safety controls employed in refrigeration air conditioning systems

PID control implementation on real time systems
Make use of recent and new technology (Eg;Latex) for creating technical reports
Design a system according to the requirements
Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology.
☐ Describe vibration measuring instruments for industrial / real time applications along with suitable method for vibration control.
To apply the knowledge of HEVs
Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.
Emphasize the fundamentals of non-conventional power plants
☐ Understand and apply various additive manufacturing technology for product development
Formulation and solving engineering problems related to material science.
5. To introduce to student the methods of computing contact stresses and deflections
Able to prepare a project proposal
Explain the various parts of the operations and production management processes and their interaction with other business functions.

Understand the behavior of a mechanical system, by analyzing nonlinearities in vibration behavior;
Solve numerically for temperature profile and heat flux in 1D and 2D heat conduction and convection problems.
1. Students will demonstrate ability to represent acoustic parameters in terms of decibel levels for pressure, power, intensity, impedance, equivalent level descriptors, and statistical level descriptors.
5. Evaluate and measure the performance of a algorithm using modern methods of optimization..
To study concept of mathematical modelling of the control system and analyse under different time domain and frequency domain.
Understand and analyze different methods of failure. Calculate MTTF, MTBF, failure rate and hazard rate.