

**COURSE OVERVIEW PE0531**  
**Flare, Blowdown & Pressure Relief Systems**

**Course Title**

Flare, Blowdown & Pressure Relief Systems

**Course Date/Venue**

Session 1: February 16-20, 2025/Boardroom 1,  
 Elite Byblos Hotel Al Barsha, Sheikh  
 Zayed Road, Dubai, UAE

Session 2: September 07-11, 2025/Al Khobar  
 Meeting Room, Hilton Garden Inn, Al  
 Khobar, KSA



**Course Reference**

PE0531



**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs

**Course Description**



***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***



The flare, blowdown and pressure relief systems are the most important elements for emergency and operational discharge of flammable substances in the process facilities. Safety relief and flare systems control vapors and liquids that are released by pressure-relieving devices and blow-downs. Pressure relief is an automatic, planned release when operating pressure reaches a predetermined level. Blowdown normally refers to the intentional release of material, such as blowdowns from process unit start-ups, furnace blowdowns, shutdowns, and emergencies. Vapor depressuring is the rapid removal of vapors from pressure vessels in case of fire. This may be accomplished by the use of a rupture disc, usually set at a higher pressure than the relief valve.



The principal elements of the safety relief and flare systems are the individual pressure relief devices, the flare piping system, the flare separator drum, and the flare (including igniters, tips, sealing devices, purge and steam injection for smokeless burning). Application of relief devices must comply with appropriate ASME Vessel Codes and API 520/521 standards.

Design of relief devices must comply with applicable national codes and laws as well as the requirements of the insurance covering the plant or installation. National regulations not only cover safety but also environmental considerations such as air and water pollution and noise abatement.

This course presents a convenient overview of relief system details based on the full scope of API, ASME, and other code and specification requirements. It covers all aspects of relief flare systems from the emergency relief sources through the valving and flare network right to the stack and flare tip. Descriptions and design criteria will be outlined for flare tips, seals, stacks, knockout drums, header systems, relief valves, depressurization systems and basic hazard analysis. Alternative design methods will be also described with reference to the specific nature of relief and flare systems worldwide.

### **Course Objectives**

Upon the successful completion of this course, each participant will be able to:-

- Apply an in-depth knowledge and skills in the operation, maintenance and troubleshooting of flare, blowdown and pressure relief systems
- Discuss product specification and identify the different types of flow measurement
- Review the various instrumentation and sensing devices used in flare, blowdown and pressure relief systems
- Carryout installation, troubleshooting and calibration of the control systems used in plant
- Determine the components and function of the relief systems and practice the sizing and installation of the relieving devices
- Identify the types, features and application of flare systems
- Determine the applicable codes, standards and recommended practices for flare, blowdown and pressure relief systems
- Acquire knowledge on product storage and tanks and recognize the importance of product recovery
- Evaluate the scope of waste heat recovery and explain its role in flare and pressure relief systems
- Operate, maintain and troubleshoot flare, blowdown and pressure relief system in a professional manner

### **Exclusive Smart Training Kit - H-STK®**



Participants of this course will receive the exclusive “Howard Smart Training Kit” (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

### **Who Should Attend**


This course provides systematic techniques on the operation, maintenance and troubleshooting of flare, blowdown and pressure relief systems. Operations personnel, supervisors, engineers, maintenance personnel, senior plant supervisors, operations process support engineers, design engineers and process engineers will gain an outstanding knowledge from the practical and operational aspects of the course.

**Course Certificate(s)**

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

**Certificate Accreditations**

Certificates are accredited by the following international accreditation organizations: -


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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

**Accommodation**

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

**Course Fee**

**US\$ 5,500** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.



### Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



**Mr. Mohammad Hamami**, is a **Senior Process Engineer** with an extensive practical experience within the **Oil, Gas, Refinery, Petrochemical** and **Power** industries. His experience covers **Clean Fuel Technology & Standards, Clean Fuel Specification, Emission Regulation, Crude Oil Production, Desulphurization, Synthesis Gas Production, Naphtha Isomerization, Diesel Fuel Additives, Storage Tanks Filtration, Fuel Quality Inspection, Process Plant Troubleshooting & Engineering Problem Solving, Process Equipment Operation, Process Plant Operation, Process Plant Start-up & Commissioning, Process Plant Optimization, Oil & Gas Field Operation, Oil Movement, Storage & Troubleshooting, Petroleum Refinery Process, Process Reactor Operation & Troubleshooting, LPG Oil & Gas Operation & Troubleshooting, Crude Oil & LNG Storage, LNG & LPG Plants Gas Processing, Refinery Process Operations Technology, Liquid Bulk Cargo Handling, Gas Conditioning & Processing Technology, Distillation Column Design & Operation and Gasoline & Diesel Fuel Technology**. Further he is also well-versed in **Refinery Operational Economics & Profitability, Aromatics Manufacturing Process, Hydrogen Production Operation, Steam Reforming Technology, Gas Treating, Hydro-treating & Hydro-Cracking, Catalyst Material Handling, Gas Sweetening & Sulfur Recovery, Hydro Carbon Dew Point (HCDP) Control, Heat Exchangers & Fired Heaters, Amine Gas Sweetening, Plastic Additives Selection & Application, Crude & Vacuum Process Technology, Flare & Pressure Relief Systems, Stock Management & Tank Dipping Calculation, NGL Recovery & Fractionation, Refrigerant & NGL Extraction and Catalytic Cracking & Reforming**.

During his long professional career, Mr. Mohammad worked as a **Refinery Manager, Operations Manager, Section Head/Superintendent** and **Process Engineer** for **Process Units, Utilities & Oil Movement** in various companies. He has been responsible for a number of **technological-driven world-scale hydrocarbon processing projects from beginning to successful start-up**.

Mr. Mohammad has a **Bachelor's degree in Chemical Engineering**. He is an **active member** of the **American Institute of Chemical Engineers (AIChE)** and has presented **technical papers** at its **several national meetings**. He has largely participated in the **start-up of seven world-scale process plants** which made him an **International Expert in Process Plant Start-Up and Oil Movement** and a **Certified Instructor/Trainer**.

### Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.



**Course Program**

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

**Day 1**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Product Specification</b> LP-Gas Specification Parameters • Vapor Pressure • Moisture Content • Sulfur Content • Volatile Residue • Non-Volatile Residue • Non-Specification Contaminants • Odorization
0930 – 0945	Break
0945 – 1100	<b>Flow Measurement</b> Flow Calculation Guide • Gas Measurement & Pipe Rupture • Liquid Measurement • Mass Measurement • Steam Measurement • Miscellaneous Measurement Devices • Auxiliary Equipment and Common Terms
1100 – 1230	<b>Instrumentation &amp; Sensing Devices</b> General Instrumentation Considerations • Identification • Pneumatic Power Supplies • Electronic Power Supplies • Pressure Sensors • Level Sensors • Temperature Sensors • Flow Sensors • Signal Transmitters • Pneumatic Transmitters • Electronic Transmitters • Signal Converters • Recorders and Indicators
1230 – 1245	Break
1245 – 1420	<b>Control Systems</b> Control Concepts • Control Modes and Controllers • Controller Tuning • Control Valves • Liquid Service • Sizing Calculation Procedure • Installation, Troubleshooting, and Calibration • Digital Computers • Digital First-Level Control Systems • Analytical Instruments
1420 – 1430	<b>Recap</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

**Day 2**

0730 – 0930	<b>Relief Systems</b> Relief Device Design • Blocked Discharge • Fire Exposure • Tube Rupture
0930 – 0945	Break
0945 – 1115	<b>Relief Systems (cont'd)</b> Control Valve Failure • Thermal Expansion • Utility Failure
1115 – 1230	<b>Relieving Devices</b> Safety Relief Valves • Rupture Disk • Sizing of Relief Devices
1230 – 1245	Break
1245 – 1420	<b>Relieving Devices (cont'd)</b> Relief Valve Installation • Relief System Piping Design • Knockout Drums
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Two





**Day 3**

0730 – 0930	<b>Flare Systems</b> Types of Flare Systems • Thermal Radiation • Smokeless Operation • Pilots and Ignition
0930 – 0945	Break
0945 – 1115	<b>Flare Systems (cont'd)</b> Seals • Location and Regulations • Special Relief System Considerations • Low Temperature Flaring
1115 – 1230	<b>Applicable Codes, Standards &amp; Recommended Practices</b> ASME Codes • ANSI Codes • API Publications
1230 – 1245	Break
1245 – 1420	<b>Applicable Codes, Standards &amp; Recommended Practices (cont'd)</b> NFPA Publications • OSHA Publications • CGA (Compressed Gas Association) Publications
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Three

**Day 4**

0730 – 0930	<b>Product Storage &amp; Tanks</b> Storage Classification • Working Pressures • Types of Storage • Materials of Construction • Protective Coatings • Insulation • Appurtenances • Site Preparation and Installation • Cathodic Protection
0930 – 0945	Break
0945 – 1100	<b>Product Recovery</b> Product Losses • Vapor Recovery Systems • Separators and Filters • Fired Equipment • Hot Oil System
1100 – 1230	<b>Waste Heat Recovery</b> Heat Exchangers Overview • Heat Balances • Shell and Tube Exchangers • Fouling Resistances • Film Resistances • Performance Evaluation with Sensible Heat Transfer • Condensers
1230 – 1245	Break
1245 – 1420	<b>Waste Heat Recovery</b> Reboilers and Vaporizers • Selection of Exchanger Components • Nomenclature • Shell Size and Tube Count Estimation • Operating Characteristics • Inlet Gas Exchanger • Hairpin Heat Exchangers
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Four

**Day 5**

0730 – 0930	<b>Operation, Maintenance &amp; Troubleshooting</b>
0930 – 0945	Break
0945 – 1100	<b>Operation, Maintenance &amp; Troubleshooting (cont'd)</b>
1100 – 1230	<b>Operation, Maintenance &amp; Troubleshooting (cont'd)</b>
1230 – 1245	Break
1245 – 1345	<b>Operation, Maintenance &amp; Troubleshooting (cont'd)</b>
1345 – 1400	<b>Course Conclusion</b>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course



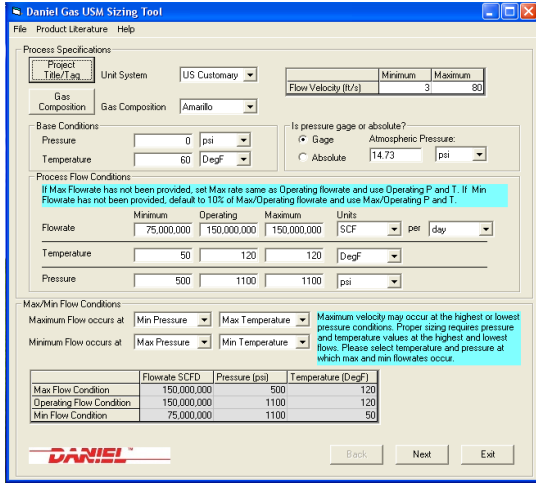




**Simulators (Hands-on Practical Sessions)**

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our “Valve Demo Kit”, “Gas Ultrasonic Meter Sizing Tool”, “Liquid Turbine Meter and Control Valve Sizing Tool”, “Liquid Ultrasonic Meter Sizing Tool” and “Orifice Flow Calculator” simulators “Valve Sizing Simulator”, “Valve Simulator 3.0”, “Valvestar 7.2 Simulator” and “PRV<sup>2</sup>SIZE Simulator”.





**Daniel Gas USM Sizing Tool**

Process Specifications

Unit System: US Customary

Gas Composition: Amairlo

Flow Velocity (ft/s): Minimum 3, Maximum 80

Base Conditions

Pressure: 0 psi

Temperature: 60 DegF

Is pressure gage or absolute?  Gage Atmospheric Pressure: 14.73 psi

Process Flow Conditions

If Max Flowrate has not been provided, set Max rate same as Operating flowrate and use Operating P and T. If Min Flowrate has not been provided, default to 10% of Max/Operating flowrate and use Max/Operating P and T.

	Minimum	Operating	Maximum	Units
Flowrate	75,000,000	150,000,000	150,000,000	SCF per day
Temperature	50	120	120	DegF
Pressure	500	1100	1100	psi

Max/Min Flow Conditions

Maximum flow occurs at: Min Pressure, Max Temperature

Minimum flow occurs at: Max Pressure, Min Temperature

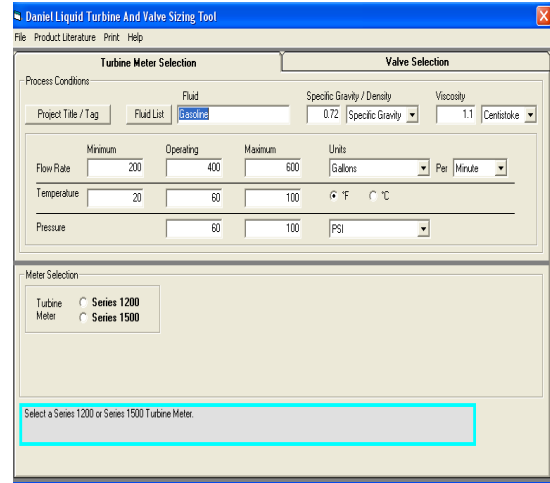
Maximum velocity may occur at the highest or lowest pressure conditions. Proper sizing requires pressure and temperature values at the highest and lowest flows. Please select temperature and pressure at which max and min flowrates occur.

	Flowrate SCFD	Pressure (psi)	Temperature (DegF)
Max Flow Condition	150,000,000	500	120
Operating Flow Condition	150,000,000	1100	120
Min Flow Condition	75,000,000	1100	50

DANIEL

Back Next Exit

**Gas Ultrasonic Meter (USM) Sizing Tool Simulator**



**Daniel Liquid Turbine And Valve Sizing Tool**

Process Conditions

Fluid: Gasoline

Specific Gravity / Density: 0.72

Viscosity: 1.1 Centistoke

Flow Rate: Minimum 200, Operating 400, Maximum 600

Units: Gallons Per Minute

Temperature: 20, 60, 100

Pressure: 60, 100

Meter Selection

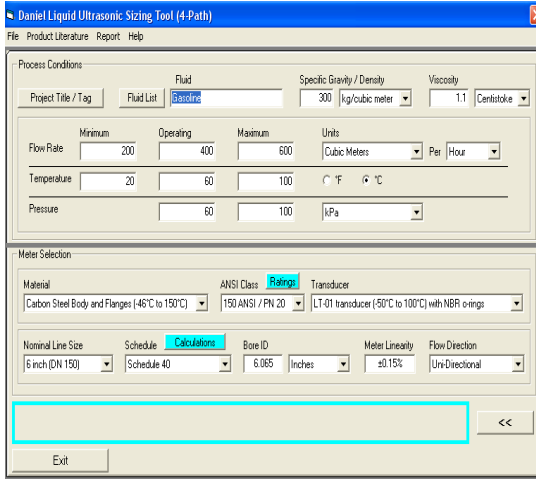
Turbine Meter

Series 1200

Series 1500

Select a Series 1200 or Series 1500 Turbine Meter.

**Liquid Turbine Meter and Control Valve Sizing Tool Simulator**



**Daniel Liquid Ultrasonic Sizing Tool (4-Path)**

Process Conditions

Fluid: Gasoline

Specific Gravity / Density: 300 kg/cubic meter

Viscosity: 1.1 Centistoke

Flow Rate: Minimum 200, Operating 400, Maximum 600

Units: Cubic Meters Per Hour

Temperature: 20, 60, 100

Pressure: 60, 100

Meter Selection

Material: Carbon Steel Body and Flanges (46°C to 150°C)

ANSI Class: Ratings

Transducer: LT-01 transducer (50°C to 100°C) with NBR o-rings

Nominal Line Size: 6 inch (DN 150)

Schedule: Calculations

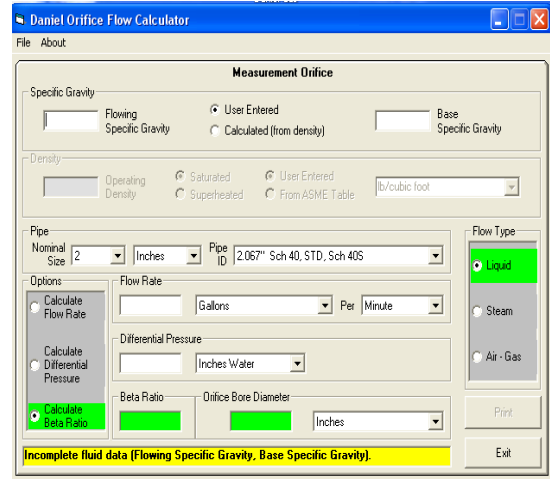
Bore ID: 6.065

Meter Linearity: ±0.15%

Flow Direction: Uni-Directional

Exit

**Liquid Ultrasonic Meter Sizing Tool Simulator**



**Daniel Orifice Flow Calculator**

Measurement Orifice

Specific Gravity:  Flowing Specific Gravity

User Entered  Calculated (from density)

Base Specific Gravity:

Density:  Operating Density

Saturated  Superheated

User Entered  From ASME Table

Pipe ID: 2.067" Sch 40, STD, Sch 40S

Flow Type:  Liquid  Steam  Air - Gas

Options

Calculate Flow Rate

Calculate Differential Pressure

Calculate Beta Ratio

Differential Pressure:  Inches Water

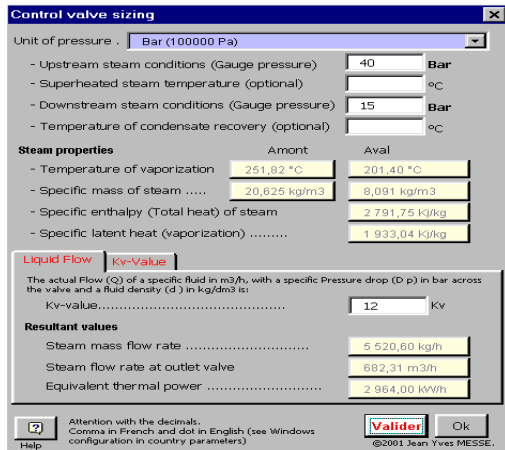
Beta Ratio:  Orifice Bore Diameter:  Inches

Incomplete fluid data (Flowing Specific Gravity, Base Specific Gravity).

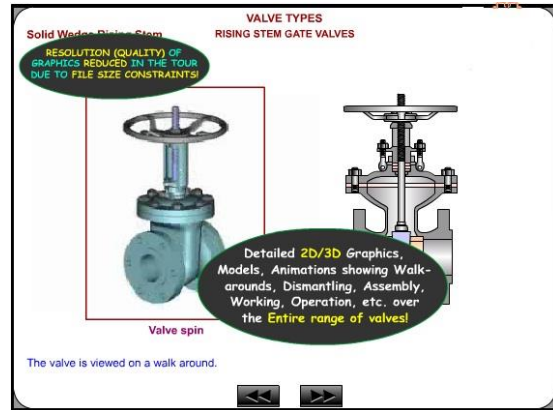
Print Exit

**Orifice Flow Calculator Simulator**

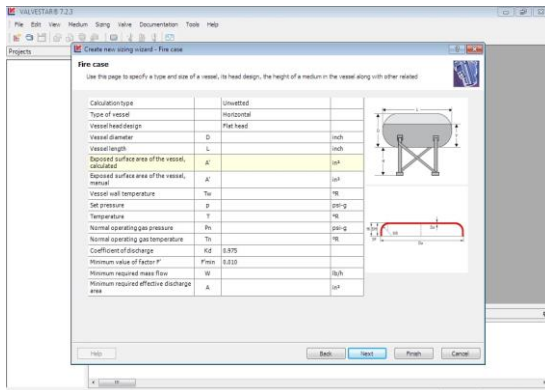




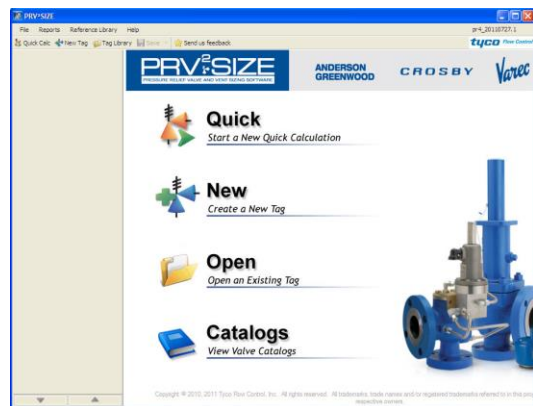
**Valve Sizing Simulator**



**Valve Simulator 3.0**



**Valvestar 7.2 Simulator**



**PRV²SIZE Simulator**

**Course Coordinator**

Mari Nakintu, Tel: +971 230 91 714, Email: [mari1@haward.org](mailto:mari1@haward.org)

