VATIS Update Ozone Layer Protection . Sep-Oct 2004

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THE SCIENCE OF OZONE LAYER

Return of the ozone hole

New data from the Envisat satellite reveal that the 2004 ozone hole over South Pole appeared about two weeks later than last year, but at a similar time period to the average during the previous decade. Precise time and range of the Antarctic ozone hole occurrences are determined through regional meteorological variations. The Scanning Imaging Absorption Spectrometer for Atmospheric Cartography (SCIAMACHY) instrument on-board Envisat provides global coverage of the distribution of ozone and other trace gases, aerosols and clouds. The Royal Netherlands Meteorological Institute processes data from SCIAMACHY in near-real time as the basis for an operational ozone forecasting service. This is one part of a suite of atmospheric information services provided under a project called Tropospheric Emission Monitoring Internet Service, which includes monitoring and forecasting ultraviolet radiation.

Website: www.esa.int

Giant research balloon launched

In Canada, researchers from the Canadian Space Agency, Environment Canada, University of Waterloo, University of Toronto and York University have launched a large research balloon as part of the intensive Middle Atmosphere Nitrogen Trend Assessment (MANTRA) project to study the ozone layer. While a series of smaller balloons were also launched, their giant predecessor carried an instrument package around 40 km high in the atmosphere, passing through most of the ozone layer in the earths stratosphere. The payload on-board the 80 m tall balloon comprised 11 devices, including the Measurements of Aerosol Extinction in the Stratospheric and Troposphere Retrieved by Occultation (MAESTRO) system, an ozone-measuring instrument from Environment Canada.

Apart from several smaller ozonesonde balloons, a smaller balloon was also released to measure bromine oxide using the Systeme DAnalyse par Observations Zenithales instrument from CNRS, France.

Contact: Mr. Kari Brintnell, Environment Canada, Communications Directorate, Toronto, Canada. Tel: +1 (416) 7394 969; Fax: +1 (416) 7394 380.

Website: www.ec.gc.ca

Growth rate of ODS declines

Climatologists in South Africa have reported a decline in the growth rate of most harmful ozone depleting gases in the atmosphere. The Cape Point global atmosphere watch station, one of only 22 such observatories on the globe, monitors trace gas composition of earths atmosphere, including green house gases. According to the weather service, the Cape Point station will remain very important in the years to come as scientists scout for the first signs indicating recovery of the ozone layer.

Website: www.bdfm.co.za

Protecting our future on Earth

Monitoring our planets atmosphere has become an international priority. The Royal Netherlands Meteorological Institute (KNMI) uses instruments on several satellites to follow the evolution of ozone around Earth. The European Space Agencys Earth observation satellite Envisat sends data to scientists at KNMI. SCIAMACHY, an instrument on-board Envisat monitors ozone and other trace gases on a regular and global basis. This data is used to calculate the amount of ozone on a daily basis. Another European satellite ERS-2 carries a similar instrument called GOME.

The United States also has a long experience in monitoring ozone with the Total Ozone Mapping Spectrometer (TOMS) instruments and NOAA Earth observation satellites. NASAs AURA mission is dedicated to the study of Earths ozone, air quality and climate. KNMI has the scientific lead of the Dutch-Finnish Ozone Monitoring Instrument (OMI) on AURA. OMI works by looking down at the Earth and measuring how much sunlight is reflected by the planet. This provides indications of how much is being absorbed by atmospheric ozone.

Website: www.sciencedaily.com

ODS PHASE-OUT IN INDIA

Workshop on Alternative Refrigerants and Cycles

A workshop on Alternative Refrigerants and Cycles was organized at Padre Conceicao College of Engineering, Goa. The Minister for Industries, Mr. Ramarao Dessai, appealed to engineers working in the air-conditioning and refrigeration industry to lay more emphasis on non-CFC refrigerants while designing new applications. Former Deputy Director of IIT, Mr. R.S. Agarwal, expressed that the Kyoto Protocol under UNFCCC proposes to superintend the growth of HFCs as a controlled greenhouse gases. He stressed on the need to investigate new alternative fluids as refrigerants and opined that the purpose of the workshop was to provide an opportunity to update academicians in engineering education on the current challenges and solutions for the refrigeration and air-conditioning sector under both protocols.

The three-day workshop covered a wide spectrum of topics, including refrigerant mixtures and Lorentz cycle, natural refrigerants, recent developments in ammonia systems and advanced absorption cycles. Faculties for the workshop comprised experts from various IITs, National Environmental Engineering Research Institute and the refrigeration and air-conditioning industry. Sponsored by the Swiss Agency for Development and Cooperation, under HIDECOR project, the workshop was organized by the agencys mechanical engineering department.

Website: www.navhindtimes.com

Phase-out of halons

India became a signatory to the Montreal Protocol in 1990 and started implementation in 1992. Prior to 1992, three types of halons were being used halon-1211 in portable fire extinguishers, halon-1301 in total flooding applications and halon-2402 in military equipment. The countrys phase-out strategy was implemented in 1992, following which:

Various halon alternatives were identified for different uses such as FM-200, NAFs, inert gases and water mist for fixed fire protection systems and ABC powder, Halotron and CO2 for portable extinguishers;

All halon manufacturing industries, including fire equipment manufacturers using halons have been assisted technically and financially to convert their production to halon-alternative technologies;

Halon-based Indian Fire Protection Standards and Codes were withdrawn and new standards and codes prepared for alternatives by the Bureau of Indian Standards; and

Halon production plants were dismantled after paying compensation to the concerned enterprises.

In all the above efforts, financial assistance was provided by the Multilateral Fund. India adopted the concept of Halon Reclamation and Banking Facility with the requisite ingredients to pool the existing halon stocks in the country and efficiently manage it for use only for essential purposes. The success of the halon phase-out effort in India is the result of combined efforts of manufacturers, users, legislative and standards bodies, research institutes, and insurance and fire authorities from around the nation. Production and consumption of halons have been reduced from 750 t/y in 1991 to almost zero in 2004. No new halons or halon-based fire extinguishing equipment are now being produced.

Website: www.pib.nic.in

Conserving halons

India has implemented 13 projects for phasing out halons in the consumption sector, thereby ensuring timely phase-out of 100 t of production and 400 t of consumption of halons as per baseline year. Funds totalling US$7 million were approved by the Multilateral Fund for phasing out halons in the country. A National Halon Reclamation and Banking Facility has also been established. In cooperation with the governments of Canada and Australia, the National Halon Management and Banking Programme was prepared by India with four objectives, namely:

Establishing a database of halon usage by large users;

Designing educational and awareness material, and training for better management of halon stocks;

Storage of halons, including recovery and reclamation; and

Formation of a panel of experts for determining essential uses of the banked halons.

Website: www.pib.nic.in

Current years activities

Since 2001, the Project Management Unit of the Ozone Cell has been conducting workshops in various states and union territories to raise public awareness on ODS phase-out. Workshops have been conducted in 33 states and five union territories to date. Participants included representatives from the Departments of Environment and Industries, Small Industries Services Institute, Pollution Control Board, Association of Refrigeration, Equipment Services Agencies, Association of Refrigerant Gas Sellers and regional offices of the Ministry of Environment and Forests. Participants were apprised of the need for the industry to avail funding and technology transfer support from the Multilateral Fund (MLF) and shift to production of goods using non-ODS. Explanations and clarifications were also offered for accessing funds available with MLF for changing over to non-ODS technologies.

Website: www.ozonecell.com

India targets phase-out of carbon tetrachloride

At a function organized to commemorate the 10th International Day for Preservation of the Ozone Layer, the Minister of State for Environment and Forests reported that India had made tremendous progress in phasing out the use of ODS in various sectors of industries that were using them. Mr. Namo Narain Meena stated that the use of CFCs in domestic, large commercial refrigeration and mobile air-conditioners had been totally changed over to non-ODS refrigerants. While the aerosol industry has opted for non-ODS propellants, the foam industry has completely eliminated the use of ODS as blowing agents. In the case of fire extinguishers, the manufacture of halons has been stopped. Another milestone was achieved with the inauguration of the Halon Bank and Recovery and Reclamation Facility, to conserve existing halon stocks for essential use only. The focus this year would be on reducing the consumption and production of carbon tetrachloride, which has to be reduced by 85 per cent of baseline production by the end of 2005.

Website: www.pib.nic.in

IN THE NEWS

MNCs pledge HFC-free production

Unilever, Coca-Cola and McDonalds have promised to stop using environmentally hazardous chemicals in refrigeration equipment at their operations spread around the globe. Unilever Ice Cream company states that it will be sincere in buying only HFC-free freezers from 2005. The freezers have already been introduced in Denmark, the Netherlands, Greece, Switzerland and the United Kingdom. The company reports that it will have nearly 15,000 HFC-free cabinets in its fleet by this year-end. Furthermore, lab-scale trials indicate that hydrocarbon freezers are more energy efficient, using up to 15 per cent less energy to keep ice cream at the right temperature than other models. Long-term trials in Australia exhibited a 9 per cent reduction in energy usage than HFC cabinets.

Similarly, Coca-Cola has pledged to not purchase new cold drink equipment that use HFCs. The company also plans to reduce energy consumption of individual equipment by 40-50 per cent over the next ten years. The new freezing systems will use propane, a hydrocarbon, as the refrigerant. Coca-Cola successfully tested 50 hydrocarbon freezers at the 2000 Sydney Olympics, in response to Greenpeaces Greenfreeze campaign and its drive to green the Olympics games.

Website: www.beveragedaily.com

Protocols success must inspire other environmental pacts

In a message celebrating this years International Ozone Day, the United Nations Secretary-General Mr. Kofi Annan stated that success achieved in implementing the Montreal Protocol for Protecting the Ozone Layer should inspire signatories to accede to other environmental treaties. After 17 years of the protocol coming into existence, over 90 per cent of global production and consumption of ODS has been phased out. Consistent progress is also evident on the path to reduce and eliminate the remaining production and consumption. Some of the challenges that have to be still overcome are the following.

Achieving, by 1 January 2005, a 50 per cent reduction in the consumption of some ODS in developing countries. Some of them may not meet this target and will need additional financial and technical assistance.

Phasing out production and consumption of methyl bromide (MB). As of next year, MB is banned in developed nations, except for those quantities approved by the Parties to the Montreal Protocol for critical uses, mainly for agricultural purposes.

Phasing out CFCs used in medical inhalers, to treat asthma and chronic obstructive pulmonary diseases, which has proved to be slow and difficult even though there are alternatives to CFCs. This suggests the need to continue with creating public awareness regarding ozone-friendly products or for international cooperation in making them available.

Cracking down on the illegal trade in ODS and unauthorized production and consumption.

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Website: www.unis.unvienna.org

Global inventory of ozone-damaging pesticides

On the occasion of this years International Ozone Day, the Executive Director of UNEP urged all countries to redouble efforts for assessing the quantities of methyl bromide (MB) being used to eliminate pests on shipments of agricultural crops. Mr. Klaus Toepfer stated that significant knowledge gaps exist regarding the true levels of MB being used around the globe. He said that this could have implications for global efforts aimed at repairing the ozone layer. Mr. Toepfer implored countries to support a worldwide survey being carried out for UNEPs Ozone Secretariat, so that governments could be better informed on the precise quantities of the chemical being used globally.

While MB is being phased out for some agricultural purposes like fumigation of soils and pest control on farms, the Montreal Protocol has exempted its use in other pest control purposes involving exports of commodity crops, animal fodder, cut flowers, hides and consignments in wooden pallets. It is estimated that close to a fifth of MB used globally could be excluded from control measures under these Quarantine and Pre-shipment exemptions, with the amounts growing in some regions. Under the Montreal Protocol, developed

nations are required to end their use of MB on farms by this year-end.

Contact: Mr. Eric Falt, Spokesperson/Director of UNEPs Division of Communications and Public Information, Nairobi, Kenya. Tel: +254 (2) 623 292

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Website: www.unep.org

Project to control desertification and ozone depletion

In Pakistan, projects undertaken by the Ministry of Environment for controlling desertification and ozone depletion will receive financial assistance from UNDP totalling US$564,000. These projects are Sustainable Land Management for Combating Desertification in Pakistan and Institutional Strengthening of the Ozone Cell within the Ministry for looking after matters pertaining to phasing out ODS under the Montreal Protocol. The first project will focus on mitigating the causes and effects of land degradation on the structural and functional integrity of dry land ecosystems through capacity building, institutional strengthening and on-the-ground interventions for sustainable land management. The Global Environment Facility has provided US$340,000, through UNDP, for this programme, prepared by the Ecosystem Management and Natural Resources Conservation programme of the NEAP-Support programme under the Forestry Wing of the Environment Ministry.

The other programme involves extension of phase III of the project for Institutional Strengthening for Implementation of the Montreal Protocol to phase out ODSs, costing US$224,467. The Ozone Cell will continue to follow up and implement all related activities like legislative, licensing, data reporting, providing technical and financial assistance to the local industry to adopt non-ODS technology, public awareness and coordination among implementation of different amendments in the Montreal Protocol, implementation of Refrigeration Management Plan, Solvents and Halons Management Plans, etc. UNDP will also provide US$31,500 to promote energy-efficient housing technology to the Agha Khan Foundation.

Website: www.paktribune.com

Workshop on monitoring and controlling ODS imports

A Training the Trainers Workshop for Customs Officers on Import Monitoring and Control of ODS was organized in the Maldives. Sessions were held on the types of ODSs and import prevention steps as well as identification of such substances. Equipment to be employed in this process were handed over to the Customs by the Environment Research Centre. The workshop and equipment are intended to reinforce the Customs capability in identifying and monitoring ODS. Organized as part of the activities under the Refrigerant Management Plan, experts from UNEP and the Indian National Academy of Customs and Excise and Narcotics conducted the sessions. The Deputy Minister of Atolls Development, Ms. Fathimath Sheereen Abdulla, presented certificates to the participants during the closing ceremony.

Website: www.maldivesinfo.gov.mv

New refrigerant in Indonesia

PT Pertamina (Persero), Indonesia, has launched a new energy-saving and eco-friendly refrigerant. Musicool is

a hydrocarbon refrigerant that can be used in automobile air-conditioning systems, split/window refrigeration units, water dispensers, cold storages and chillers. The refrigerant is commonly used in developed nations like Australia, Canada, Europe, Japan and the United States since it is environmentally friendly, non-toxic, has low global warming effect and can save up to 40 per cent of energy. It will replace Freon used at Pertaminas offices and operation units all over the country.

Contact: PT Pertamina, Jalan Merdeka, Timur No. 1 A, Jakarta 10110, Indonesia. Tel: +62 (21) 3815 111; Fax: +62 (21) 3846 865/3843 882; Tlx: 44152.

Website: www.pertamina.com

CFC-free Sri Lanka

The Sri Lankan government has in principle decided to ban the use of CFCs, which are commonly used in fridges, air-conditioners, etc., two years ahead of the stipulated deadline in 2010. According to Mr. Indrapriya Kularatne, Consultant to the National Ozone Unit of the Ministry of Environment and Natural Resources, a policy decision has also been made to not issue licenses for importing CFCs. Mr. Kularatne stated that several projects have been completed by the Ozone Unit, including conversion of three refrigerator manufacturing plants into ozone-friendly technologies (from CFC-12 to R-134a) and adopting eco-friendly technology at an aerosol manufacturing factory.

Website: www.dailynews.lk

Capacity building to eliminate CFCs in the Philippines

In the Philippines, the Department of Trade and Industry (DTI) has initiated a series of capacity building programmes for regional and provincial enforcers to learn and have a harmonized understanding of the standard requirements of CFC-free fridges and room air-conditioners. This project involves DTIs Bureau of Product Standards (BPS) and the Environmental Management Bureau of the Department of Environment and Natural Resources (DENR-EMB). Mr. Jesus Motoomull, Director of DTI-BPS, expressed that In order to support the National CFC Phase-out Plan (NCPP), BPS has to embark on standardization and conformity assessment activities through development, promulgation and implementation of standards on all products that affect the environment.

The first leg of the regional training seminar was held during 7-9 July. Thirty-eight representatives from NCR, Regions III, IV and V attended this workshop. The other programmes include the 21-23 July seminar organized for DTI enforcers from Regions XI and XII, the workshop series for DTI enforcers from Regions VI and VII (26-28 July), Region IX and ARMM (4-6 August), Regions I, II and CAR (18-20 August), and Region X and the CARAGA area (25-27 August). At each of these events, DTI-BPS discussed the needs of the Philippine National Standard (PNS) International Electrotechnical Commission (IEC) 335-2-24: 2001 Amendment 1:2003 and PNS IEC 335-2-40:2000 Amendment 2:2004 for refrigerators and room air-conditioners, respectively. Other topics discussed include implementing guidelines and timetable of activities for each product and the Department Administrative Order 2:2002, which defines in detail the responsibilities and liabilities of those involved such as importers, manufacturers, wholesalers, distributors, retailers and/or their agents to properly implement the BPS Product Certification scheme. As partner agency of DENR-EMB in implementing the NCPP, DTI-BPS has developed and adopted international standards to assist in the phase-out plan. These standards stipulate the needs in manufacturing, preparing and labelling the products as CFC-free.

Website: www.pia.gov.ph

Philippines curbs ODS entry

In the Philippines, the government has strengthened its control on the entry of ODS. This measure is designed to phase out importation of ODS soon to protect the environment and public health. The newly-appointed Customs Commissioner, Mr. George Jereos, is also scrutinizing appropriate sanctions to be imposed on Filomeno Import-Export International for importing CFC-12 without a shipment import clearance from the Department of Environment and Natural Resources (DENR). DENR states that imports of ODS is either banned or regulated on the basis of environmental laws and orders issued in compliance with the governments commitment to the international accord.

Website: www.abs-cbnnews.com

ODS use in Viet Nam

Viet Nam is striving to eradicate the use of ODS by 2010 through assistance from the Multilateral Fund (MLF). Under the National Phase-out Plan, scheduled to be implemented in 2005, the Ministry of Natural Resources and Environment would provide tool kits free of charge for use by any businesses to repair refrigeration appliances as part of their after-sales service. Businesses have to only commit themselves to not use ODS and send their workers on training courses held by the ministry, to learn new techniques for repairing refrigeration appliances. Additionally, the ministry will warn consumers not to purchase fridges and air-conditioners that use substances that damage the ozone layer.

Following official participation in the Vienna agreement on Preservation of the Ozone Layer and the Montreal Protocol, Viet Nam has implemented 28 projects through US$4 million non-refundable aid provided by the MLF. Out of these, 13 involved transferring technologies to replace existing ODS-using ones at chemical and cosmetic production enterprises, and textile and refrigerating factories. As a result, the yearly use of CFCs decreased from 500 t to 230 t. More importantly, since late 1995, no halons have been employed in the fire protection industry.

Website: www.hoovers.com

Bangladesh may fall short of phase-out target

In Bangladesh, officials with the Ozone Cell, Department of Environment, report that while 50 per cent reduction of ODS can be achieved in 2005, it would be very difficult to fulfil the 85 per cent mark stipulated for 2007. According to Dr. S.K. Purakayestha, a senior official of Ozone Cell, implementation of CFC-free technology enabled the aerosol sector to completely eliminate CFCs by 2002, thereby reducing overall ODS consumption by around 50 per cent. However, hurdles are aplenty in phasing out the remaining ODSs used in refrigerators, air-coolers, mobile air-conditioners (MACs), cold storages, fish freezing industries, drug producing and other sectors, which are interlinked with the nations economy. As a developing country, Bangladesh can hardly afford to discard a large number of equipment and switch over to expensive CFC-free technology.

Approximately 2.8 million domestic and commercial refrigerators and 0.6 million air coolers and MACs containing CFCs are in use throughout the country, apart from eight cold storages and an unspecified number of fish freezing industries and trawlers. In addition, the garment industry uses about 6.5 t of carbon tetrachloride while the telephone and some chemical industries require about 8.5 t of methyl chloroform annually. Furthermore, though import and use of ODS is banned, some types of machinery are being illegally

brought into the country and CFC-containing refrigerators are still imported from China and the Democratic Peoples Republic of Korea. Moreover, three pharmaceutical companies Square, Beximco and GlaxoSmithKline were exempted from the use of CFCs for producing essential drugs, which need 50 t/y of CFCs.

Website: www.bangladeshjournal.com

China on course in phase-out

Chinas Vice-Minister of the State Environmental Protection Administration Ms. Wang Jirong stated that the nations commitment to protect the ozone layer has made remarkable progress. The country is expected to achieve its ODS phase-out goal by 2010. Production and consumption of ODSs have been reduced to a great extent under the national ODS phase-out plan. The Multilateral Fund has provided US$740 million for over 400 projects to eliminate ODSs. By last year-end, production and consumption of CFCs dropped by 40 per cent and 55 per cent, respectively, compared with that in 1997, while production and consumption of halons decreased by 85 per cent.

After years of development, Chinas enterprises and research bodies have been able to develop and produce a series of ODS substitutes. In addition, the country has set up and improved a system of policies, laws and regulations on the phase-out of ODSs. However, Executive Secretary of UNEPs Ozone Secretariat, Mr. Marco Antonio Gonzalez, states that China needs to strengthen the enforcement framework to control production, consumption and trade of ODSs. There is also a need to focus on R&D for ODS substitutes.

Website: www.humanrights-china.org

Role of market forces in HCFC phase-out

Taiwan predicts that it will require a few more years to totally phase out the manufacture of HCFC air-conditioners. Mr. Chi Chuan Wang, Thermo-fluids Department Manager of Taiwans Industry Technology Research Institute, states that this is because of price competition in export markets (which limits the usage of more expensive CFC-free refrigerants) as well as inefficient maintenance capability of new refrigerants. Teco Electric and Machinery Co. Ltd. has been using R-407c and R-410a refrigerants manufactured in the United States for its European exports since last year. It does not use CFC-free refrigerants for markets that do not ban CFC refrigerants as CFC-free products are more expensive, not as efficient and require different maintenance procedures. The company has an R&D team, which focuses on developing CFC-free refrigerants in-house. Some of the companies following this trend are Sampo Corp. (R-407c refrigerants from Japan is used in for air-conditioners exported to Europe, Japan and Australia) and Tatung Co. (uses R-407c from Japan for air-conditioners exported to Europe, but uses R-22 for local and other export markets).

Website: www.globalsources.com

REFRIGRATION/AIR-CONDITIONING

Cold climate heat pump

Theoretically, an air-source heat pump can run at 400 per cent efficiency, under optimal conditions, delivering four times more energy than it uses. However, as outdoor temperatures drop, conventional air-source heat pumps deliver less and less heat. Nyle Special Products LLC, the United States, offers a multiple-stage Cold Climate Heat Pump (CCHP), which delivers more heat as outside temperatures become colder, thereby

exhibiting an overall performance that rivals many geothermal heat pumps. Among other innovative features, the CCHP is designed to take full advantage of the non-ozone depleting R-410a refrigerant, which can withstand up to 70 per cent higher pressure and has 40 per cent better cooling capacity than R-22.

Like other air-source heat pumps, CCHPs capacity starts to decrease as outdoor temperatures drop. However, at 2C, a booster compressor kicks in to double the pumps output capacity. When the booster compressor comes on, the first stage begins to act as a preheater while the second stage raises the temperature and pressure of the refrigerant. Then, at about -7C, when standard air-source heat pumps have fully switched over to inefficient electric-resistance heating, the CCHPs performance is further enhanced by an economizer a heat exchanger that reclaims waste heat from the refrigerant, increasing its heat-absorbing properties. CCHP incorporates electric-resistance strip heating and can even accommodate dual-fuel installations, integrating with gas- or oil-fired back-up heat.

Contact: Nyle Special Products LLC, P.O. Box 1107, Bangor, ME 04402, United States of America. Tel: +1 (207) 9422 865;

Website: www.nyletherm.com

Website: www.buildinggreen.com

New refrigerator model

Toshiba Corp., Japan, is offering a refrigerator that incorporates enhanced insulation and provides the lowest energy consumption. The Freon-free Senzoko GR-NF415GX combines high performance with just 150 kWh/y of energy consumption. This model is the first to incorporate a two-stage inverter compressor housing two compression mechanisms within a single compressor and a pulse motor valve control system enabling a two-stage cooling cycle for simultaneous cooling of refrigeration and freezer compartments.

Equipped with a twin-plasma system for cold air circulation for both refrigeration and freezing, the Senzoko GR-NF415GXs digital signal processor controlled inverter has been optimized in relation to the two-stage cooling cycle. Additionally, the adoption of vacuum insulation panels and the optimization of the insulation thickness of parts result in higher insulation performance.

Contact: Corporate Environment Management Division, Toshiba Corp., 1-1, Shibaura 1-chome, Minato-ku, Tokyo 105 8001, Japan. Fax: +81 (3) 5444 9206.

Website: www.toshiba.co.jp

High-efficiency centrifugal compressor lowers energy cost

In the United States, a lightweight, lubrication-free refrigeration compressor that can be used with new non-ozone depleting refrigerants has been developed under the Lubrication-free, Magnetic Bearing, High-efficiency Centrifugal Compressor programme sponsored by the Aero Propulsion and Power Directorate. The efficiency for this low flow rate centrifugal compressor has been raised from 60 per cent to 80 per cent; efficiencies nearing 90 per cent are also achievable. Increasing the efficiency of lubrication-free compressors will significantly lower energy costs, while increasing military and commercial applications for centrifugal

compressor heat pumps.

Contact: Propulsion Directorate-WPAFB Operation, AFRL/PR, 1950, 5th Street, Wright-Patterson AFB, OH 45433 7251, United States of America. Tel: +1 (937) 2552 520; Fax: +1 (937) 2554 657.

Website: www.pr.afrl.af.mil

Compression/absorption heat pump

The Institute for Energy Technology, Norway, offers a compression/absorption heat pump that uses water/ammonia as its working fluid. Developed with funds granted by the Research Council of Norway, York Refrigeration, Alfa Laval, Mobil and Statoil, the heat pump has a nominal thermal power output of 300 kW. A unit installed at a dairy plant in 2003 has been operating steadily for 4,000 h, supplying heat for pasteurization, hot water to a dairy and heat (70-95C) for district heating.

The compression/absorption cycle opens new possibilities for a flexible plant. Process traits can be manipulated by varying the ratio between the mass flow of water/ammonia blend and ammonia mass flow through the compressors. Additionally, accumulating working fluid in different parts of the process also affects the solution ratio between water and ammonia, thus changing the process characteristics.

(IEA Heat Pump Centre Newsletter, Vol. 22, No. 2/2004)

R-744 air-conditioning system

Valeo, France, has developed an eco-friendly air-conditioner that complies with future European Union regulations. In this system, R-134a refrigerant is substituted with R-744, thereby eliminating the direct impact of air-conditioning systems on global warming caused by refrigerant leakages. Based on CO2, the Valeo R-744 system was tested on a demonstration vehicle by automotive experts at the SAE Alternate Refrigerant Symposium in the United States. It successfully completed three days of formal tests with ambient temperatures up to 43C in both city traffic and highway driving conditions. The company expects the new system to be on the market by 2009.

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Website: www.valeo.com

CO2 compressor

Danfoss Air-conditioning and Refrigeration, the United States, offers TN type hermetic compressor for carbon dioxide (CO2). This compact unit can operate at pressures up to 2,000 psig and requires significantly less energy compared with HFC-based compressors of similar capacity. Suitable for hot water heat pumps and commercial applications, including bottle coolers, vending machines and display cases, the compressor bagged the AHR Innovation Award.

Contact: Ms. Lisa Tryson, Danfoss Air-conditioning and Refrigeration, United States of America. Tel: +1 (410) 9318 250

Website: www.danfoss.com

Efforts to develop a hi-tech coolant

Researchers at Delphi Corp. are taking a leading industry role in developing new refrigerants for future automotive air-conditioning systems. The effort involves perfecting a system that uses a coolant which, even if it escapes accidentally, will not contribute to global warming. Mr. Stefan Glober, Delphi Thermal and Interiors Director of Engineering for Europe and South America, heads the programme at the corporations Luxembourg technical centre in Europe. Other work is being carried out at the companys Lockport facility. Mr. Glober expressed that there are two basic options that can be used as a refrigerant in future air-conditioning systems: carbon dioxide or R-152a. Delphi is developing both solutions.

Website: www.msnbc.msn.com

Chillers use HFC-134a

Carrier Corp. of the United States, which introduced a complete line of chillers with high-efficiency non-ozone depleting refrigerant, announced that it would enhance its commitment to the environment by providing a 0.1 per cent leak-proof warranty on its Evergreen family of chillers shipped after 1 October 2004. Using HFC-134a refrigerant, Evergreen Chillers provide the lowest published leak rate in the industry, owing to the hermetic motor design and ASME construction. These units also provide an industry-leading part-load efficiency, which is where chillers operate 99 per cent of their life. Under the new warranty, Carrier will provide coverage against refrigerant leaks for the first five years of ownership. Those who agree to a service contract can have their warranty extended for the life of the chiller.

Website: www.jarn.co.jp

SOLVENTS

AC flush

Air-conditioners (ACs) and refrigeration systems become contaminated with large quantities of particulates, sludge, acids, carbon residues and possibly moisture when they suffer from failures, most commonly a compressor burnout. These contaminants have to be eliminated before the system is returned to service. Generally, CFC-based solvents were employed for this purpose. As an alternative to these ozone depleters, the multinational company Honeywell offers new HFC-based flushing agents. The powerful Genesolv cleaners offer all the benefits provided by CFCs and are effective in scrubbing the inside of the refrigeration system. They dry quickly, have a low boiling point, low odour and will not attack the system components. Along with the solvent, the company has developed a closed-loop, completely recyclable flushing solution for the industry, which involves the use of flushing equipment available for both automotive and stationary AC maintenance. Products in the Genesolv S series, based on HFC-245fa, are well-suited for stationary AC and refrigeration flushing. Genesolv 2000 and 2004 series are HCFC-141b-based products intended as interim substitutes for CFC-113 and CFC-113/alcohol solvent blends used in drying, cleaning and deposition applications. However, since the use of HCFC-141b has been prohibited, Genesolv S series products have been designed as

replacements for HCFC-141b-based products in aerosol solvent applications and certain deposition applications. Genesolv S series comes in three grades Genesolv SF (standard grade), Genesolv S-TZ (enhanced solvency - an azeotropic blend) and Genesolv S-T (maximum solvency power).

Genesolv SF is mild and non-inflammable with excellent plastics compatibility, a low order of toxicity and good environmental properties. It has no ozone depletion potential, a low global warming potential and has been designated as a non-VOC by the Environmental Protection Agency. Where greater solvency and cleaning ability are required, the S-TZ and S-T blends, which contain HFC-245fa and trans 1,2-dichloroethylene, are recommended.

Contact: Honeywell Singapore Pte. Ltd., 17, Changi Business Park, Central #01-01, Honeywell Building, Singapore 486073. Tel: +65 6355 2828; Fax: +65 6783 2949.

Website: www.honeywell.com

Natural solvent promises safer cleaning power

Florida Chemical Inc., the United States, recently launched a new solvent that is ideal for cleaning parts, paint, ink and graffiti. The biodegradable, water-soluble, non-carcinogenic and non-corrosive Citrus Burst 7 is a mixture of d-limonene and naturally derived esters. It is recommended for cleaning in the electronics industry as it dries quickly without leaving behind any film or residues and does not require surfactants. All components of Citrus Burst have either a Generally Recognized As Safe (GRAS) or food-grade rating from the United States Food and Drugs Administration. Each component is derived from natural plant sources and the product has zero ozone depleting potential.

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Website: www.floridachemical.com

Ozonaction Newsletter, No. 47, May 2004

Effective solvent for cleaning aircraft oxygen lines

In the United States, researchers from the Air Force Research Laboratory and Aeronautical Systems Centre (ASC) have identified a suitable, temporary replacement for Freon 113. This project was funded by the ASCs pollution prevention branch. Dubbed AK 225G, the solvent provides cleaning properties on par with Freon 113, a widely used ODS to clean liquid and gaseous oxygen systems in aircraft and ground service equipment.

Seven solvents were evaluated by experts as Freon 113 replacements. Two types of testing, liquid oxygen mechanical impact ignition resistance and autogenous ignition temperature, were concerned with the compatibility of the candidates with liquid and gaseous oxygen, which is critical to the safety of working with the solvents. Other important characteristics tested were compatibility of system materials, immersion cleaning ability and wipe cleaning capability. Additionally, the candidate solvent had to be eco-friendly and possess non-toxicity features at levels acceptable for user exposure. These tests confirmed the superiority of AK 225G

as the most effective of the batch tested.

Contact: HQ Air Force Material Command, 4375, Chidlaw Road, Bldg. 262, Room N-152, Wright-Patterson AFB, Ohio 45433, United States of America. Tel: +1 (937) 2577 603.

Website: www.afmc.wpafb.af.mil

New cleaner-degreaser

Stoner Inc., the United States, offers a powerful, fast-acting, non-chlorinated and non-CFC precision cleaner and degreaser. CUT removes contaminants from tools equipment, moulds, metal parts, etc. It dissolves and flushes away most release agents from metal moulds. Incorporating potent cleaning agents to remove grease, oil, carbon deposits, tar, gum, dirt, wax, silicones, adhesives, ink, etc., the quick-evaporating and residue-free cleaner-degreaser is compatible with metals and solvent-resistant material. For high-temperature use or applications requiring a non-inflammable cleaner, Stoner A496 non-inflammable cleaner-degreaser is available.

Contact: Stoner Inc., 1070, Robert Fulton Hwy., Quarryville, Pennsylvania 17566, United States of America. Fax: +1 (717) 7869 088

Website: www.criticalcleaning.com

Degreaser for electric motors

Diversified Brands, the United States, is offering Sprayon Liqui-Sol 20703LQ electric motor degreaser and safety solvent. This chlorinated liquid formulation can penetrate and lift dirt, grease and tars from electrical components. It is non-ozone depleting, non-corrosive, non-staining and does not require washing or flushing. With a dielectric strength of 39,500 V, the solvent does not harm insulators or leave behind any residue.

Sprayon Ultra-Force II solvent/degreaser instantly penetrates to remove dirt, oil, grease and wax. It is safe on all ferrous and non-ferrous metals and most plastics, and has a dielectric strength of 15,000 V. Recommended for electric motors, air tools, clutches, sprockets, material handling equipment, generators, brakes, wire ropes, radar equipment and air-conditioners, this product is also available in No-HAPS Formula.

Contact: Diversified Brands, 101, Prospect Ave., 9, Midland Bldg., Cleveland, OH 44115, the United States. Fax: +1 (614) 2942 956

Website: www.news.thomasnet.com

AEROSOLS

ODS-free delivery mechanism for asthma drug

Inyx has acquired a Swiss-developed drug delivery technology, which facilitates formulation of drug therapies

with two or more active compounds, even if they are incompatible or unstable. The novel technology employs a lipid-binding matrix, which can combine drugs that would ordinarily be difficult to formulate in the same inhaler, usually because the molecules have different properties, e.g. they may have different solubilities. Inyx plans to co-formulate drugs for asthma patients in a single inhaler device, thus making treatment easier and improve compliance with treatment. Benefits of the technology include extremely reproducible dosing and the ability to formulate compounds that have stability problems when used along with the non-ozone depleting propellant hydrofluoroalkane (HFA).

Website: www.inpharma.com

New-generation inhaler

Boehringer Ingelheim GmbH of Germany has launched the first Respimat product, Berodual Respimat. Respimat Soft Mist Inhaler (SMI) is a new-generation, propellant-free inhaler developed by the company as an innovative approach to inhaler therapy. In this system, a liquid solution pressed through a capillary tube passes through a unique nozzle system which produces the Soft Mist, with cloud properties that result in better lung deposition. The liquid is forced by the mechanical power of a tensioned spring. The easy-to-use Respimat SMI improves the targeting of medication and reduces deposition in the mouth and throat.

Website: www.respimat.com

CFC-free inhaler

Boehringer Ingelheim Ireland Ltd. has introduced a new CFC-free formulation. The firms Atrovent inhaler will replace the currently available CFC-containing Atrovent inhaler. This device is similar to the one it will be replacing and delivers the same dose per puff of ipratropium bromide. Apart from a slight change in taste observed by some patients, the new inhaler is otherwise similar to the CFC-based inhaler.

Website: www.irishmedicalnews.ie

HALONS

Fire suppression system for commercial airliners

In the United States, Fire Pass and International Aero Technologies have developed a new method for protecting airliner cargo compartments. Low-pressure dual fluid water mist fits the bill as a halon replacement in commercial aircraft cargo compartments. Along with hypoxic air, the patented low-pressure dual-fluid nozzle far surpasses any halon alternative material tested to date.

The novel low-pressure dual-fluid misting nozzle, developed by NAVAIR in the mid-90s, has been used on several full-scale aircraft and flight tests. A major benefit offered by the nozzle is that it does not clog and performs well from 2-100 psi. Mixing the water and hypoxic conditioning air in variable pressures still results in the same size water droplets. The mister can dispense water horizontally up to a distance of 7 m at a pressure of 1 bar.

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98233, United States of America. Tel: +1 (360) 7572 376; Fax: +1 (360) 7574 841

E-mail: redoll@intl-aerotech.com

Website: www.intl-aerotech.com

Replacement for halon-1301

In the United States, Naval Technology Centre for Safety and Survivability (NTCSS) has developed a halon-1301 replacement for use in total flooding applications. The heptafluoropropane (HFP) and water spray cooling system (WSCS) combination has been propounded as an acceptable halon-1301 substitute in new ship designs. WSCS is a low-pressure, low-technology water mist system, which produces water drops large enough to reach fires from even a high overhead but small enough to vaporize readily. To address the significant HF concentrations and high temperatures resulting after HFP fire extinguishment, NTCSS has developed and validated the complementary WSCS for use with gaseous agents. A series of tests examining different compartment geometries and obstructions has demonstrated the effectiveness of WSCS used together with total flooding gaseous agent systems. The Army replaced halon-1301 systems with HFP and the NRL patented WSCS in over 60 of their watercraft engine compartments up to 1,700 m3 in volume.

Based on the NTCSS testing, NAVSEA 05P4 has recommended implementation of WSCS used with HFP in large FLSRs on the new construction platforms.

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E-mail: sheinson@code6185.nrl.navy.mil

Website: www.fire.nist.gov

CF3I as inerting agent in fuel tanks of F-16 aircraft

The Director of Defence Research and Engineering, the United States, convened an Independent Review Panel (IRP) to asses four critical technical issues that may affect implementation of CF3I as a viable halon-1301 substitute for inerting applications in the F-16 aircraft. The four technical areas identified as critical are materials compatibility, low-temperature performance, human toxicology and atmospheric chemistry. Conclusions arrived at by the IRP are:

CF3I is more chemically reactive than halon-1301;

CF3I is inadequate as a replacement for halon-1301 in the existing F-16 system because of its higher boiling point and resultant reduced delivery pressure at low temperatures;

CF3I is more toxic than halon-1301;

Ozone depletion from F-16 application of CF3I could be as small as one-eighth that of halon-1301 (at lower altitudes) or as large as one and two-thirds as damaging as halon-1301 (at higher altitudes); and

CF3I use on-board an F-16 would be a Class I substance if significant amounts are released above 20,000 feet and the nations Clean Air Act bans the use of Class I substances.

Contact: Building and Fire Research Laboratory, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, United States of America.

Website: www.fire.nist.gov

FUMIGANTS

Biological pest control

In the Netherlands, Kema and Iv-Water have undertaken tests for a large rice producer to examine the eradication of entomological contamination. Insects, eggs and larvae from pests like red flour beetle (Tribolium castaneum) and grain weevil (Calandra oryzae) contaminate rice. The partnership has developed an organic pesticide based on Cold Plasma to eradicate these pests. The physical method employs non-thermal plasma generated by a glow discharge. This is 100 per cent effective for the entire ontogenetic process, with a treatment time of just a few seconds. It has also been established that this technology is extremely suitable for sterilizing products and deactivating bacteria and fungi, reducing enzyme activity, deactivating viruses and breaking down mycotoxins.

Contact: Iv-Water b.v., P.O. Box 1155, 3350 CD Papendrecht, the Netherlands. Tel: +31 (78) 6448 333; Fax: +31 (78) 6448 334.

Website: www.iv-groep.nl

New fumigant

Australias CSIRO and the BOC Group, a global industrial gas company, have signed an agreement to deliver to the international market a new eco-friendly fumigant for treating soil, insect pests, weeds and diseases. The duo will commercialize ethanedinitrile (EDN), discovered by CSIRO in 1994, as a substitute for methyl bromide (MB). Field trials of EDN have demonstrated that it is more effective than MB in remediation of soil, timber and imported feed for livestock. Under the agreement, CSIRO will help BOC and develop efficacy data for the fumigant with BOC registering the product and identifying suitable manufacturers for EDN.

Website: www.spacedaily.com

Pepper helps increase nematode resistance

The Charleston Belle pepper developed at the Agricultural Research Service, the United States, has the ability to resist major root-knot nematodes. A study has confirmed the effectiveness and heat tolerance trait of Charleston Belles resistance gene and also unveiled that the gene benefits nematode-susceptible vegetables rotated with the pepper. In field trials, Charleston Belle repelled nematodes and also protected subsequently

planted (double-cropped) susceptible squash and cucumber crops. In fact, the crops produced larger yields and heavier fruit than when they were grown after the Keystone Resistant Giant, Charleston Belles parent.

The Charleston Belle peppers resistance may aid growers who, from next year onward, must fight root-knot nematodes without using MB. Various independent studies have shown that nematode-resistant varieties, notably tomatoes, can help shield double-cropped vegetables from nematode attacks.

Website: www.ars.usda.gov

Ozone vacuum fumigation for green coffee

Green coffee imported into Hawaii is fumigated with methyl bromide (MB) to eliminate any infestations of coffee leaf rust (Hemileia vastatrix Berk. and Br.) and coffee berry borer (Hypothenemus hampei Ferrari), two of the most destructive pests of coffee production worldwide, but not found in Hawaii. A team from the United States Agricultural Research Service and the University of Hawaii, on behalf of the Hawaii coffee industry, are developing an alternative quarantine treatment to MB fumigation for green coffee. Under a Cooperative Research and Development Agreement between the United States Department of Agriculture and Cosmed Group Inc., the team is developing ozone vacuum fumigation using PureOx Sterilization and Fumigation Services ozone technology and equipment. Since eco-friendly ozone is used, the process can be certified as an organic treatment.

Ozone fumigation parameters used were 10,000 ppm under -30.5 cm Hg of vacuum at 133C for 6 h. Preliminary Cosmed Group data indicates that these treatment parameters are quite adequate to control the target insect and plant pathogen pest. Fumigations were undertaken using PureOx commercial or experimental chambers for both cupping (coffee quality) and coffee berry borer mortality tests. Mortality tests with coffee leaf rust are yet to be initiated.

Contact: Ms. Catherine G. Cavaletto, College of Tropical Agriculture and Human Resources, University of Hawaii, Manoa, Honolulu, Hawaii.

Website: www.mbao.org

Tomato grafting as methyl bromide alternative

Tomato is attacked by many soil-borne pathogens including Fusarium (Fusarium oxysporum f. sp. lycopersici, races 1 and 2), Verticillium wilts (Verticillium dahliae, races 1 and 2), bacterial speck (Pseudomonas syringae p.v. tomato), bacterial canker (Clavibacter michiganense), root-knot nem-atodes (Meloidogyne spp.) and Orobanche (Orobanche ramosa). Notable pathogens are Fusarium, Verticillium and root-knot nematodes, which are controlled using 98 per cent methyl bromide (MB) and 2 per cent chloropicrin. However, the use of MB has to be discontinued owing to its ozone depleting nature. Researchers at the Institut Agronomique et Veterinaire Hassan II, Morocco, report that grafting is a viable replacement to the use of MB for tomato cultivation.

Once considered as too expensive, grafting is now widely used at a commercial level in Morocco and several other countries. Resistant rootstocks provide excellent control of many tomato soil-borne pathogens, particularly F. oxysporum f. sp. radicis-lycopersici, F. oxysporum f. sp. lycopersici., P. lycopersici and Meloidogyne spp. In addition, tomato grafting offers other benefits like growth promotion and yield increase,

tolerance to low temperatures, growth period extension and fruit quality. When grafted plants are used, the same yield or a higher one can be obtained with half the number of plants compared with non-grafted varieties.

Website: www.mbao.org

Protected culture of strawberry better than MB fumigation

In the United States, researchers at the University of Florida report that greenhouse production of strawberry by soil-less culture can be considered as a valid replacement to field production using methyl bromide (MB). Strawberries in protected culture are grown in troughs and plant densities can be increased up to five times, leading to higher yields. The fruit is protected from soil and rain splash and the humidity is lower. Fungal disease incidence, particularly botrytis and anthracnose, is decreased and so fruit quality is enhanced. Apart from eliminating the need for soil fumigation, this method offers benefits like:

Yields per acre is up to five times greater than field-grown;

Pesticide-free fruits;

Harvest efficiency can be improved by 25-30 per cent; and

Production is increased during the early season.

Website: www.mbao.org

New soil disinfestation treatment method

Atofina, France, has been developing DMDS (one of the key compound of allium, a natural fumigant) as an alternative to the use of methyl bromide (MB) for soil disinfestation in shank and drip applications (pure product and 95 per cent emulsifiable concentrate). Results from previous as well as current studies indicate that DMDS is a broad-spectrum fumigant that has nematicide, fungicide, insecticide and herbicide effects. DMDS exerts a complex mode of action through mitochondria dysfunction and activation of ATP-sensitive potassium channels and inhibits cytochrome oxydase. Tested under laboratory conditions, DMDS was said to be a promising soil fumigant based on the following preliminary conclusions:

Fungicide effects showed in terms of lethal concentration time products that a rate of 3,249 g.h/m3 can destroy 90 per cent of resistant form of four soil-borne pathogens (Sclerotinia sclerotiorum, Sclerotium rolfsii, Rhizoctonia solani and Phytophthora cactorum); and

DMDS diffuses quickly through a depth of 33 cm of sandy loamy soil in soil columns, followed by homogeneous gas concentrations after 24 h.

Since 2002, several studies have been conducted for developing tools for the measurement of gas concentrations in the soil and to determine the influence of several covering systems on DMDS gas concentrations. It has been concluded that DMDS has immense potential in shank and drip application, under VIF on fungi at the rate of 600-800 kg/ha and on nematodes at 300 kg/ha. DMDS is still under evaluation for its efficacy on weeds, bacteria and insects, while studies in association with chloropicrin is under progress.

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Website: www.mbao.org

Hot water treatment as methyl bromide replacement

In Japan, soil-borne disease caused by continuous cropping is the most important obstacle to be overcome for stable production, particularly in protected horticulture. Hot water treatment has recently raised interest as the most promising methyl bromide (MB) alternative. In the late 1970s, prototype hot water application systems were developed independently by the Kanagawa Horticulture Experiment Station in Ninomiya and the National Agricultural Research Centre in Tsukuba. Both prototypes, though different in the hot water delivery method, apply hot water at 70-95C on to the soil surface and raise the soil temperature to levels lethal for plant pathogens as well as pests and weed seeds by wet-heat pasteurization.

At present, two types of application systems are available for hot water treatment dragging and tube-watering systems. The dragging system comprises a boiler, winch and hot water sprayer. The sprayer has a rectangular stainless steel frame and a one-inch size pipe with two rolling floats, and can treat 4.5 to 9 m wide plots. Hot water, from a diesel-fired boiler, is supplied at a flow rate of 70-100 l/min to the sprayer placed under the plastic film through a heat-tolerant hose. While dragging the sprayer using the winch with a set of wires at speeds up to 1.5-5 m/h, hot water is sprinkled over the soil surface from small holes along the rear pipe. The amount of hot water to be sprayed can be adjusted by the width of the sprayer and dragging speed. Generally, this system can treat 45 m2 per hour with the maximum sprayer width and dragging speed. It is suitable for large-scale treatments of flat fields. In the tube-watering system, hot water is supplied from a boiler and sprinkled out from heat-resistant tubes with small holes placed on the soil surface pre-covered with plastic film. Tubes are normally set up with intervals at 20-60 cm, depending on the target diseases and the amount of hot water treated. This system is ideal for small-scale treatments and sloped fields.

Promising effects of hot water treatment on soil-borne disease control have been demonstrated on crops such as tomato, melon, strawberry, rose, spinach, sweet pea, carnation, etc.

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