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Jet Emissions



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[Decision Support Model to Evaluate Methods for Reducing Air Pollution Emissions during](#)

Dec 1995 133 pages

[Jet Engine Testing](#)

Authors: [Jeffrey R. Ullmann](#); [AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH](#)

... Oxides of SulAir, and Unburned Hydrocarbons. Currently, the **emissions** from these engines are not regulated while the ... test the engines' operation at each power setting. **Emissions** during these tests are permitted under Title V ... Air Combat Command effectively test its **jet** engines and still comply with the environmental requirements ... engine testing. This review focused on the underlying causes of **emissions** and potential methods to reduce these **emissions**; ... notional methods for meeting regulatory requirements by reducing **emissions** during the testing of Air Combat Command's **jet** engines. These notional ...

Full Text

[Emissions Reduction by Catalytic Reformulation of Jet Fuel](#)

May 21, 2002 34 pages

Authors: [James Markham](#); [Patrick Bush](#); [Michael Best](#); [Alvin Berlin](#); [William Lueckel](#); [ADVANCED FUEL RESEARCH INC EAST HARTFORD CT](#)

... and reactive volatile organic compounds (VOCs). The **emissions** of particulate matter including soot are also a ... innovative catalyst with potential to reformulate **jet** fuel to result in reduced **emissions** from gas turbine engines. Phase I work completed **emissions** measurements from a modular, atmospheric combustor, and a ... lb thrust gas turbine engine. For both, **jet** fuel went through an exposure period ... canisters of catalyst were also tested. **Emissions** measurements were performed for sequential firing ... fuel) showed no measurable benefit in **emissions** reduction by any of the catalyst formulations tested. ...

Full Text

[New Technology for Controlling NOx from Jet Engine Test Cells. Phase 1](#)

Jan 1995 47 pages

Authors: [Richard K. Lyon](#); [ENERGY AND ENVIRONMENTAL RESEARCH OF NJ WHITEHOUSE WHITEHOUSE LAB](#)

... U.S. Air Force has been concerned with NOx **emissions** from **jet** engine test cells operated by the ... Force. While there are no regulations limiting the NOx **emissions** of these facilities, such regulations could develop in ... Force because no available technology is suited for application to **jet** engine test cells. This report describes laboratory studies ... could be ideally suited to controlling NOx emission from **jet** engine test cells. Thus, experiments were done ... in amounts up to at least 23.5 percent of its initial weight. The practical implication is that NOx **emissions** of a **jet** engine test cell could be ...

Full Text

[Reduction of Particulate Emissions in Turbine Engines Using the +100 Additive](#)

Jun 2006 33 pages

Authors: [Edwin Corporan](#); [AIR FORCE RESEARCH LAB WRIGHT-PATTERSON AFB OH PROPULSION DIRECTORATE](#)

... of fuel burned. The total amount of particulate **emissions** for aircraft in the United States is estimated at 3 million kg ...), causing a variety of respiratory problems. Particulate **emissions** contribute to environmental problems such as visibility impairment ... and may contribute to increased signature (infrared **emissions**) from military aircraft, thus increasing aircraft detectability ... The health and environmental concerns from particulate **emissions** motivated this work to evaluate the use of the +100 (... SpecAid 8Q462) additive in **jet** fuel as a means to reduce the particulate **emissions** from military gas ...

Full Text

[Historical Air Emissions Estimate, Kelly Air Force Base, TX](#)

Mar 2000 73 pages

Authors: [Kelley Dennison](#); [EARTH TECH INC SAN ANTONIO TX](#)

Earth Tech was tasked to collect and analyze historical **emissions** data from Kelly Air Force Base (AFB), TX. They were limited ... activities, respectively. These years would give a "worst case" scenario of the air **emissions** at Kelly AFB. Earth Tech was also limited in scope of work to specific Air Force industrial processes (**jet** engine testing, painting, depainting, and degreasing). These industrial processes included the ... , xylene, methylene chloride, methyl ethyl ketone, perchloroethylene, components of burned **jet** fuel (cadmium, chromium, formaldehyde, benzene, arsenic, and 1,3-butadiene), and ...

Full Text

[Fuel Microemulsions for Jet Engine Smoke Reduction](#)

May 1980 52 pages

Authors: [D. W. Naegeli](#); [G. E. Fodor](#); [C. A. Moses](#); [SOUTHWEST RESEARCH INST SAN ANTONIO TX MOBILE ENERGY DIV](#)

The concept of water and alcohol/fuel microemulsions for the purpose of reducing smoke **emissions** from **jet** engine test cells was studied in a T-63 gas turbine combustor. Several ethanol/fuel, methanol/fuel and water/fuel microemulsions were prepared with JP-4 and JP-8 ... takeoff, climb, cruise and ground idle operating condition, and the exhaust smoke, flame radiation and gaseous **emissions** were measured. The exhaust smoke and flame radiation were significantly reduced by the additions of alcohols and water to ...

Full Text

[Manual for Estimating Cost of VOC Removal from Groundwater Contaminated with Jet Fuel](#) May 1992 138 pages

Authors: [R. M. Counce](#); [J. H. Wilson](#); [C. O. Thomas](#); [MARTIN MARIETTA ENERGY SYSTEMS INC OAK RIDGE TN](#)

Full Text

... makers for use in evaluation and selection of air stripping with **emissions** control technology. The development of this manual was part of a larger ... field study and demonstration of the state of the art in air stripping with **emissions** control technology. The intent of the guidance manual is to provide ... stripping technology for remediation of contaminated groundwater indicates that the use of **emissions** control devices for systems for air stripping of VOCs from ... by operating rather than capital costs. Air Stripping, **Emissions** Control, VOCs, Groundwater Contamination, Catalytic Oxidation, Carbon ...

[Development and Demonstration of a New Filter System to Control Emissions During Jet Engine Testing](#) Oct 15, 1992 79 pages

Authors: [B. W. Nelson](#); [D. A. Van Stone](#); [S. G. Nelson](#); [SANITECH INC TWINSBURG OH](#)

Full Text

Measurable quantities of NOx, CO and small particulates are produced and are emitted into the atmosphere during the testing of aircraft engines in **jet** engine test cells (JETCs). These **emissions** have been and are a concern to the Air Force and to others who test aircraft engines. The large quantities of exhaust gases that are generated, the wide range of testing conditions that are normally employed, and the sensitivity of engines to back pressures make control difficult and the use of conventional con

[Manual for Estimating Cost of VOC Removal from Groundwater Contaminated with Jet Fuel](#) May 1992 140 pages

Authors: [R. M. Counce](#); [J. H. Wilson](#); [C. O. Thomas](#); [OAK RIDGE NATIONAL LAB TN](#)

Full Text

... makers for use in evaluation and selection of air stripping with **emissions** control technology. The development of this manual was part of a larger ... field study and demonstration of the state of the art in air stripping with **emissions** control technology. The intent of the guidance manual is to provide ... stripping technology for remediation of contaminated groundwater indicates that the use of **emissions** control devices for systems for air stripping of VOCs from ... by operating rather than capital costs. Air stripping, **Emissions** control, VOCs, Groundwater contamination, Catalytic oxidation, Carbon ...

[Characterization of Aerosols from JP-8 Fuels in Jet Engine Emissions](#) May 29, 1998 107 pages

Authors: [Phillip M. Schumacher](#); [BATTELLE COLUMBUS OH](#)

Full Text

The **emissions** of the engine of a C-130E aircraft were studied under low ambient temperature (~ 20 deg F) start-up conditions at Minneapolis AFS, MN in January 97. Samples of the engine **emissions** were collected using SUMMA(Registered) canisters, PS-1 medium volume samplers, and cascade impactors. The collected engine **emissions** were chemically analyzed by GC/MS to determine the airborne concentration of volatile organic compounds (VOC), unburned JP-8 fuel, and polynuclear aromatic hydrocarbons ...

[Infrasonic Emissions from the Otis AFB Hush House](#) Sep 10, 1990 42 pages

Authors: [Alan L. Kafka](#); [Joseph I. Blaney](#); [WESTON OBSERVATORY MA](#)

Full Text

... by a single point source located in the vicinity of the exhaust deflector. The results of this study suggest that a non-vertical **jet** plume might be an appropriate source model for the Hush House infrasonics. When tested at military power, engines installed on a test stand produce slightly stronger infrasonic **emissions** than engines installed in an aircraft. The most significant factor in the overall level of infrasonic **emissions**, however, is whether the engines are run at military power or in afterburner. The azimuthal radiation pattern of infrasonics generated by ...

[TCNOISE: A Computer Program to Calculate Noise Levels and Directivity from a Jet Engine Test Cell](#) Oct 1997 36 pages

Authors: [C. A. Kodres](#); [T. W. Lancey](#); [NAVAL FACILITIES ENGINEERING SERVICE CENTER PORT HUENEME CA](#)

Full Text

This report presents the Fortran program TCNOISE (Test Cell NOISE). The program predicts noise emitted by **jet** engine test cells. It is to be used in conjunction with the Naval Facilities Engineering Service Center's **jet** engine test cell aerothermal performance computer model, reading output files from this code to acquire the flow properties necessary for the calculation of **jet** noise and surface noise. The theoretical basis of TCNOISE, instructions for running the program, example runs, and comparisons of program predictions with measured noise **emissions** are included in the report.

[Jet Engine Test Cell Noise Reduction](#) Aug 2000 77 pages

Authors: [C. A. Kodres](#); [NAVAL FACILITIES ENGINEERING SERVICE CENTER PORT HUENEME CA](#)

Full Text

Passive methods for decreasing **jet** engine test cell noise **emissions** are evaluated and compared. Such methods have the dual advantages of low cost and simplicity. In ... of noise reduction techniques conducted using a 1/20th scale physical model of the Navy's standard T-10 **jet** engine test cell. Methods that attack the noise problem from outside and methods that attack ... acoustic walls, core busters, and modifications to the exhaust stack. Mounting screens in the path of the **jet** and increasing the height of the exhaust stack are found to be the most effective.

[Environmental Analysis of Possible Sulfur Increases in USAF Jet Fuels](#) Feb 1975 22 pages

Authors: [Dennis F. Naugle](#); [AIR FORCE WEAPONS LAB KIRTLAND AFB NM](#)

Full Text

This analysis addresses the question of whether environmental considerations should be the limiting constraint to possible increases in sulfur content of USAF **jet** fuels. Such increases are proposed in order to increase the availability of **jet** fuels such as JP-4. The current average sulfur content of 0.05% by weight and two hypothesized levels of 0.4 percent and 1.0 percent are analyzed in this study. Aircraft **emissions** and meteorological conditions around an airbase are maximized to produce predicted 'worst-case' ambient air quality levels.

[Advanced Thermally Stable Coal-Based Jet Fuels](#)

Oct 2007 40 pages

Authors: [Harold H. Schobert](#); [PENNSYLVANIA STATE UNIV UNIVERSITY PARK ENERGY INST](#)[Full Text](#)

This report summarizes briefly the key results of a project for the development of coal-based **jet** fuel. The initial focus of the project was the development of a high heat sink fuel, JP-900, that ... reactors was invariably lower than JP-8 or JP-8+100. Mechanisms of oxidative deposit formation for both **jet** and diesel fuels are proposed to account for the fact that the chemistry involved in both ... formation in middle distillates is similar. The fuel was successfully tested in a T63 turboshaft engine, with **emissions** only slightly greater than JP-8. Well over a hundred publications resulted from the ...

[Advanced Thermally Stable Coal-Based Jet Fuels](#)

Feb 2008 40 pages

Authors: [Harold Schobert](#); [PENNSYLVANIA STATE UNIV UNIVERSITY PARK ENERGY INST](#)[Full Text](#)

This report summarizes briefly the key results of a project for the development of coal based **jet** fuel. The initial focus of the project was the development of a high heat sink fuel, JP 900, that ... reactors was invariably lower than JP-8 or JP-8+100. Mechanisms of oxidative deposit formation for both **jet** and diesel fuels are proposed to account for the fact that the chemistry involved in both ... formation in middle distillates is similar. The fuel was successfully tested in a T63 turboshaft engine, with **emissions** only slightly greater than JP-8. Well over a hundred publications resulted from the ...

[Controlling Combustion-Source Emissions at Air Force Sites with a New Filter Concept.](#)

Apr 1994 56 pages

[Phase 1](#)Authors: [Sidney G. Nelson](#); [David A. Van Stone](#); [Brian W. Nelson](#); [Kenneth A. Peterson](#); [SORBENT TECHNOLOGIES TWINSBURG OH](#)[Full Text](#)

... particulate matter, sulfur dioxide (SO₂), and a long list of compounds considered toxic by nature. Recently, Sorbent Technologies Corporation (Sorbtech) developed a new filter technology for the Air Force to control **emissions** from **jet** engine test cells. The objective of the project described in this report was to conduct a preliminary evaluation of other possible Air Force applications of the new filter technology. The project was conducted at Sorbtech's laboratories ...

[Oscillations in Gas-Turbine Combustors; Control of Rumble, Pattern Factor and Emissions](#)

Apr 1, 1996 1 pages

Authors: [J. H. Whitlaw](#); [IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON \(UNITED KINGDOM\)](#)[Full Text](#)

... with low frequency oscillations as might be expected. The T-vaporiser used for kerosene fueling of the gas-turbine sector has been replaced by a double **jet** arrangement to allow the use of gaseous fuel and preliminary experiments show first that the pattern factors are poor as a result of the poorer mixing associated with forward injection of fuel and second that reduction in NOx **emissions** are again present with magnitudes of the order of 20%. Perhaps most promising is the application of oscillations to neighbouring fueling devices, but out of phase, so ...

[Multifunctional Fuel Additives for Reduced Jet Particulate Emissions](#)

Jun 2006 153 pages

Authors: [Christopher J. Montgomery](#); [Adel F. Sarofim](#); [Bradley R. Adams](#); [Eric Eddings](#); [Joseph Bozzelli](#); [Viswanath Katta](#); [REACTION ENGINEERING INTERNATIONAL SALT LAKE CITY UT](#)[Full Text](#)

This report was developed under SBIR contract. A study on fuel additives to suppress soot **emissions** from gas turbines burning JP-8 was completed. The program consisted of a multifaceted approach involving experimental and computational screening tools to assess the effectiveness of multifunctional additives. The experimental program demonstrated that a laminar drop tube furnace at the University of Utah could effectively screen a large number of additives relatively rapidly and inexpensively as a function of furnace temperature, injection orifice size, injection pressure, and oxygen ...

[Predictive Model for Jet Engine Test Cell Opacity](#)

Sep 30, 1981 73 pages

Authors: [Gordon A. Lewandowski](#); [NEW JERSEY INST OF TECH NEWARK](#)[Full Text](#)

A computer program (written in FORTRAN for a CDC 6600) was developed to predict the plume opacity of **jet** engine test cells. The data input required for the model includes: the particle density, concentration, and size distribution in the exhaust gas, and ... and measured transmittance was generally within one percent. The program also predicts the theoretical effect of using electrostatic precipitators or venturi scrubbers to treat the exhaust **emissions**. These predictions indicate that control devices larger than the test cells would have to be installed to even achieve a minimal effect on the ...

[Use of Metal-Oxide Electrocatalysts to Control NOx Emissions from Fixed Sources](#)

Sep 1990 53 pages

Authors: [Michael A. Petrik](#); [LACKLAND MILITARY TRAINING CENTER LACKLAND AFB TX](#)[Full Text](#)

The objective of this effort was to determine the feasibility of using solid-state electrochemical technology to remove NOx from the exhaust of **jet** engines during static firing tests in **jet** engine test cells. This report details laboratory testing of electrolytes and spread-sheet-based design calculations. Data and design calculations suggest that electrochemical control of NOx is feasible in challenging environments; however, implementation of a ...

[Turbulent Mixing Processes in a Swirling-Multiple Jet Confined Crossflow Configuration](#)

Sep 10, 1999 7 pages

Authors: [I. D. Kalogirou](#); [A. G. Bakrozis](#); [D. D. Papailiou](#); [PATRAS UNIV \(GREECE\) DEPT OF MECHANICAL ENGINEERING](#)[Full Text](#)

... occurring in a rectangular perspex mixing module simulating a sector of an annular RQL gas turbine combustor, through an experimental investigation of non reacting multiple **jet** mixing with a confined swirling crossflow. The RQL (Rich burn - quick Quench - Lean burn) staged combustion concept has been proposed as one of the candidate technologies towards reducing NOx **emissions** in gas turbine combustion systems. Mean and fluctuating momentum and scalar field distributions, mixing rate and standard deviation were determined in a

number of ...

[Characterization of Jet Engine Exhaust Particulates for the F404, F118, T64, and T58 Aircraft Engines](#)

Mar 2002 37 pages

Authors: [L. A. Shumway](#); [SPACE AND NAVAL WARFARE SYSTEMS CENTER SAN DIEGO CA](#)

[Full Text](#)

In this study, jet engine exhaust particulate samples collected from four military aircraft engines were analyzed for particle morphology. Particulate emissions from three of the engines were also analyzed for polycyclic aromatic hydrocarbons (PAHs). The F118, F404, T58, and T64 engines were tested in four modes: approach, idle, military, and intermediate. The F404 engine was also tested in afterburner mode. Conclusions and recommendations are made based on the test results.

[Leak Detection by Acoustic Emissions Monitoring: An Experimental Investigation of the Acoustic Properties of Leaks and the Attenuation Characteristics of Soil](#)

May 27, 1994 96 pages

Authors: [James F. Kilpatrick](#); [Patrick A. March](#); [ECLECTECH OAK RIDGE TN](#)

[Full Text](#)

This study experimentally explored the conditions, equipment, and methodology necessary for the acoustic detection of small leaks of jet fuel (JP4) from underground storage tank (UST) systems. The study indicates that acoustic leak detection of very small leaks is feasible. In general, significant JP4 fuel leaks which occur across a 5 PSI (pounds per square inch) or greater pressure drop are acoustically active and can be detected with proper sensors and proper placement of sensors. The primary source of leak noise is turbulent flow through the leak orifice. At lower pressures, the leak flow ...

[Acoustic Emissions of Bubble Clouds in Salt Water](#)

Jun 2003 7 pages

Authors: [Thomas Berger](#); [SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA CA MARINE PHYSICAL LAB](#)

[Full Text](#)

Experiments were performed to investigate the sound from an axi-symmetric, conical bubble plume formed by a continuous, vertical water jet as it penetrates the surface of a pool of water.

[MEMS Technology for Jet Fuel Atomization](#)

Sep 2, 2004 22 pages

Authors: [James Nabity](#); [Sean Rooney](#); [TDA RESEARCH INC WHEAT RIDGE CO](#)

[Full Text](#)

The objective of this research was to develop a microelectromechanical system (MEMS) atomizer which could produce small (less than 50 micron) droplets in order to improve gas turbine flameholding and reduce emissions.

[Scaling Criteria for the Development of an Acoustically Stabilized Dump Combustor](#)

Aug 4, 2000 9 pages

Authors: [Jerald A. Cole](#); [Timothy P. Parr](#); [Neil C. Widmer](#); [Kenneth J. Wilson](#); [Klaus C. Schadow](#); [William R. Randall](#); [ENERGY AND ENVIRONMENTAL RESEARCH CORP IRVINE CA](#)

[Full Text](#)

... relatively short residence time with simultaneously low emissions of oxides of nitrogen, carbon monoxide, and hydrocarbons. ... a compact device capable of achieving pollutant emissions performance better than required by current international ... , factors governing vortex generation and jet mixing theory were examined. These provided ...) acoustic driving frequency, and characteristic jet mixing time. Burner performance was maintained or improved as both jet velocity and jet area were increased approximately as the square ... led to higher CO and NOx emissions, but emission performance continued to exceed ...

[Aviation and the Environment: Aviation's Effects on the Global Atmosphere Are Potentially Significant and Expected to Grow](#)

Feb 2000 51 pages

Authors: [GENERAL ACCOUNTING OFFICE WASHINGTON DC RESOURCES COMMUNITY AND ECONOMIC DEVELOPMENT DIV](#)

[Full Text](#)

... the contribution of human activities, including aviation. Jet aircraft are among many sources of greenhouse gases-gases ... Our report focuses on the effects of subsonic jet aircraft engine emissions on the upper atmosphere-above 3,000 feet- ... and does not address the effects of these emissions on local air quality. A recent international We focused on commercial civilian subsonic jet aircraft because they account for the majority of aviation emissions; military and general aviation aircraft ... , we use the terms "aviation" and "jet aircraft" interchangeably reconciling Observations of Global ...

[DSMC Study of Flowfield and Kinetic Effects on Vibrational Excitations in Jet-Freestream Interactions](#)

May 15, 2002 3 pages

Authors: [David H. Campbell](#); [ENGINEERING RESEARCH AND CONSULTING INC\(ERC INC\) EDWARDS AFB CA](#)

[Full Text](#)

Vibrational excitation of molecular species emitting from a jet into a high-speed free stream is a process with importance to the prediction of high-altitude rocket exhaust plume infrared emissions. Accurate predictions of these emissions are necessary ... was used to simulate the interaction between a carbon monoxide jet and a high velocity free stream of oxygen atoms oriented at 90 degrees to the jet flow axis at 150 kilometers simulated altitude. A ... fully developed laminar boundary layer profile to obtain sensitivities to the jet inflow startline. SMILE, a software system based on the ...

[Natural Attenuation of Hydrocarbon and Trichloroethylene Vapors in the Subsurface Environment at Plattsburgh Air Force Base](#)

Mar 26, 1997 382 pages

Authors: [David W. Ostendorf](#); [Alan J. Lutenegeger](#); [Sarina J. Ergas](#); [Erich S. Hinlein](#); [Russell J. Suchana](#); [MASSACHUSETTS UNIV AMHERST DEPT OF CIVIL AND ENVIRONMENTAL ENGINEERING](#)

... field research from 19 September 1995 to 30 September 1996 under Contract No. F41624-95-C-8012 "Surface Emissions from Jet Fuel Bioventing at Plattsburgh AFB". The work focused on bioventing of residual JP4 jet fuel

and chlorinated solvents in the unsaturated zone and capillary ... that natural attenuation processes, stimulated by injected air, reduce **emissions** of hydrocarbons and trichloroethylene vapors to acceptable air quality standards ... solid core sampling, maximum assimilative capacity testing, and **emissions** testing. UMASS completed this work through detailed subtasks:

[Full Text](#)

[Hush House Induced Vibrations at the Arkansas Air National Guard Facility, Fort Smith,](#)

Nov 13, 1987 106 pages

[Arkansas](#)

Authors: [James C. Battis](#); [AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA](#)

The T-10 **jet** engine ground run-up noise suppressor, or Hush House, was designed to reduce the audible effects of **jet** engine testing on the surrounding community. At least in part, the noise suppression characteristics of the Hush House ... 20 Hz) to the infrasonic range (<20 Hz). At some sites these lower frequency **emissions** have had deleterious effects on the vibro acoustic environment of nearby buildings. This report describes a ... inadequate; in one case being too stringent and in another case too lax. An acoustic **emissions** model for the Hush House is proposed based on multiple **jet** type sources.

[Full Text](#)

[Engine Gaseous, Aerosol Precursor and Particulate at Simulated Flight Altitude Conditions](#)

Oct 1998 176 pages

Authors: [C. C. Wey](#); [NATIONAL AERONAUTICS AND SPACE ADMINISTRATION CLEVELAND OH LEWIS RESEARCH CENTER](#)

... scientific bases for assessing atmospheric impacts of the exhaust **emissions** by both current and future fleets of Among the six primary elements of the AEAP is **Emissions** Characterization. The objective of the Emission Characterization effort is ... Whitney F100-200E turbofan engine. Aviation fuel (**Jet A**) with a range of fuel sulfur was used. Low and ... , were assembled for the gaseous and particulate **emissions** characterization measurements study. NASA extractive system ... unburnt hydrocarbons (THC), and SO₂. Particulate **emissions** were characterized by University of Missouri-Rolla Mobile Aerosol ...

[Full Text](#)

[Composition and Photochemical Reactivity of Turbine Engine Exhaust](#)

Sep 1984 196 pages

Authors: [C. W. Spicer](#); [M. W. Holdren](#); [T. F. Lyon](#); [R. M. Riggins](#); [BATTELLE COLUMBUS LABS OH](#)

The environmental impact of organic compounds emitted from **jet** aircraft turbine engines has not been firmly established due to the lack of ... rates and identities of the compounds. The objectives of this project were to identify and quantify the organic compounds present in gaseous **emissions** from **jet** engines and to study a photochemical reactivity of these compounds. These objectives were met through a five-task approach. Tasks 1 ... 5 involved analysis and interpretation of results. Originator furnished keywords include: Turbine engines; Organic **emissions**; Environmental analysis; Photochemistry.

[Full Text](#)

[Laboratory Evaluation of a Reactive Baffle Approach to NOx Control](#)

Sep 1993 41 pages

Authors: [S. G. Nelson](#); [D. A. Van Stone](#); [R. C. Little](#); [R. A. Peterson](#); [SORBENT TECHNOLOGIES TWINSBURG OH](#)

... removed NO_x (and carbon monoxide and particles) from combustion exhausts in a subscale drone **jet** engine test cell (JETC), but back pressure so generated elevated the ... of the duct or of baffles parallel to the direction of flow within the ducts. **Jet** engine test cells (JETCs) are stationary sources of oxides of nitrogen (... oxidized carbon compounds that form as byproducts of imperfect combustion. Regulation of NO_x **emissions** is being considered for implementation under the Clean Air Act Amendments of 1990. Several principles have been examined as candidate methods to control NO_x **emissions** from JETCs

[Full Text](#)

[NOx Removal in Jet-Engine Test Cell Exhaust: Proposed Non-Thermal Plasma Systems and Economic Considerations](#)

1999 40 pages

Authors: [Louis A. Rosocha](#); [Jen-Shih Chang](#); [Kuniko Urashima](#); [Seock J. Kim](#); [Andrzej W. Miziolek](#); [LOS ALAMOS NATIONAL LAB NM](#)

... and economic. Given considerable regulatory pressure, e.g., the promulgation of a NESHAPS (National **Emissions** Standard for Hazardous Air Pollutants) for NO_x **emissions** in CY 2000, new de-NO_x technologies are being explored. One major reason for this is that conventional ... 10(6) Nm³/h), and low gas temperatures (near ambient) characteristic of **Jet** Engine Test Cells (JETCs). Our project is currently evaluating non-thermal ... design options for NTP reactor systems for a field-pilot demonstration on small **jet** engines (e.g., F107 or F112; flow rates ^104) Nm³/h). The ...

[Full Text](#)

[Numerical Analysis and Optimization of the Ultra Compact Combustor](#)

Mar 2005 99 pages

Authors: [Roger T. Greenwood](#); [AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL OF ENGINEERING AND MANAGEMENT](#)

In an effort to increase thrust per weight ratio and decrease pollutant **emissions** of aero-turbine **jet** engines, a circumferentially burning Ultra Compact Combustor (UCC) with a Cavity-in-a-Cavity design has been developed. A ... and four alternative physical configurations of the UCC have been modeled. **Emissions**, combustor efficiencies, temperature and velocity profiles, and pressure ... reduced combustor pressure drop significantly with only minimal increases in pollutant **emissions**. The addition of a curved vane to the decreased cavity length configuration further decreased ...

[Full Text](#)

[Potential Benefits from the Use of JP-8 Fuel in Military Ground Equipment](#)

Feb 1989 41 pages

Authors: [Alan F. Montemayor](#); [Leo L. Stavinoha](#); [Sidney J. Lestz](#); [Maurice E. LePera](#); [SOUTHWEST RESEARCH INST SAN ANTONIO TX BELVOIR FUELS AND LUBRICANTS RESEARCH FACILITY](#)

... . The main benefits associated with use of JP-8 in military ground equipment are simplified logistics, increased readiness, reduced exhaust **emissions**, and better lubricant life. The information contained in this report is intended to delineate those areas where the use of JP-8 ... aviation activities. These operations should be monitored for benefits as well as possible problems and the lessons learned applied accordingly. **Jet** engine fuels; Kerosene; Fuel additives; Diesel fuels; Compression/ignition engines; Sulfur/ exhaust

[Full Text](#)

emissions/particulates; Logistics; Military/ground/combat vehicles. (edc)

[Formation and Emission of Nitrogen Oxide in Gas Turbine Engines: Plume Effluent](#)

Jun 30, 1996 47 pages

[Characteristics of TF30-P111+ and TF33-P9 Engines](#)

Authors: [J. W. Dill](#); [W. A. Sowa](#); [G. S. Samuelsen](#); CALIFORNIA UNIV IRVINE COMBUSTION LAB

Full Text

Phase I of this project focused on the creation of a spatial **emissions** map of the plume effluent in the exhaust stream directly behind the engine in a **jet** engine test cell (JETC). Both afterburning TF30-P111+ and non-afterburning TF33-P9 engines were tested. Measurements were taken ... Measurements in the P111+ plume reveal levels of NOx above 300 ppm along the centerline of the effluent. A dip in the NOx **emissions** at afterburner shows signs of a reburning and/or dilution effect by the atmospheric combustion in the effluent. Significant amounts ...

[Combustion and Heat Transfer Volume 3: Combustion Studies](#)

Dec 1997 261 pages

Authors: [D. R. Ballal](#); [F. Takahashi](#); [D. Pestian](#); [W. J. Schmolli](#); [M. Vangsness](#); DAYTON UNIV OH RESEARCH INST

Full Text

... film cooling. A toroidal WSR was used to study lean blowout, combustion efficiency, and **emissions**. We found that fuel hydrocarbons of different structure and (C/H) ratio produced a noticeable influence on the combustion and **emissions** performance of a gas turbine combustor. In the vortex-flame interaction, the extinction caused by internal vortex is primarily ... bubble. In our research on turbine blade cooling, PIV measurements showed an almost doubling of the **jet** spread for an increase in free stream turbulence from 1% to 17%. and forcing of the ...

[JP-8 Volatility Study](#)

Mar 2001 36 pages

Authors: SOUTHWEST RESEARCH INST SAN ANTONIO TX

Full Text

The Clean Air Act and related State/local regulations require facilities to periodically prepare and submit air **emissions** inventories which quantify the annual **emissions** from the various stationary sources/processes located at the installation. For Air Force installations, these inventories must include the evaporative losses associated with the transfer and storage of **jet** fuel (i.e., JP-8). To accurately calculate the evaporative losses associated with fuel storage and transfer operation, the true vapor ...

[Impact of High Sulfur Military JP-8 Fuel on Heavy Duty Diesel Engine EGR Cooler](#)

Apr 14, 2008 9 pages

[Condensate](#)

Authors: [Michael Mosburger](#); [Jerry Fuschetto](#); [Dennis Assanis](#); [Zoran Filipi](#); [Heather McKee](#); AUTOMOTIVE RESEARCH CENTER ANN ARBOR MI

Full Text

... is often forced to rely on local fuel supplies, which exposes vehicles to diesel fuel or **jet** fuel (JP-8) with elevated levels of sulfur. Modern engines typically use cooled Exhaust Gas Recirculation (EGR) to meet **emissions** regulations. Using high-sulfur fuels and cooled EGR elevates problems associated with cooler fouling and ... using a condensate collection device developed according to a modified ASTM 3226-73T standard. Engine-out **emissions** were analyzed in parallel. Analysis of results indicates significantly increased levels of sulfur-dioxide and particulate ...

[Controlling Mechanisms of Pulsating Incineration Processes](#)

Sep 30, 1996 90 pages

Authors: [B. T. Zinn](#); [J. I. Jagoda](#); [L. M. Matta](#); GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

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... incinerators. Studies of jets subjected to transverse mode oscillations have shown that, under the proper conditions, the **jet** will shed large, alternating, vortical structures that can cause the **jet** to bifurcate. This process results in a greater spatial mixing rate. Transverse mode acoustic forcing had the greatest effect in the ... combustion of simulated solid wastes in an incinerator were studied. Measurements of the burning rates and the **emissions** of NOx, CO, and CO2 were performed for different fuels and conditions. In all cases ...

[Evaluation of Pilot-Scale Pulse-Corona-Induced Plasma Device to Remove NOx from](#)

[Combustion Exhausts from a Subscale Combustor and from a Hush House at Nellis AFB,](#)

May 1, 1997 83 pages

[Nevada](#)

Authors: [Sheila M. Haythornthwaite](#); [Michael D. Durham](#); [Gary L. Anderson](#); [Donald E. Rugg](#); ADA TECHNOLOGIES INC ENGLEWOOD CO

Full Text

Jet engine test cells (JETCs) are used to test-fire new, installed, and reworked **jet** engines. Because JETCs have been classified as stationary sources of pollutant **emissions**, they are subject to possible regulation under Title I of the Clean Air Act (CAA) as amended in 1990. In Phase I of the Small Business Innovation Research (SBIR) program, a novel NOx-control approach utilizing pulsed-corona-induced plasma successfully showed 90% removal of NOx in the laboratory. The objective of Phase II was to reproduce ...

[Cost Analysis and Economic Assessment of Proposed Electric-Discharge Non-Thermal](#)

[Plasma Processes for NOx Removal in Jet-Engine Exhaust: White Paper for SERDP Project](#)

Oct 29, 1998 30 pages

[CP-1038](#)

Authors: [Louis A. Rosocha](#); [Jen-Shih Chang](#); [Kuniko Urashima](#); [Seock J. Kim](#); [Andrzej W. Miziolek](#); LOS ALAMOS NATIONAL LAB NM

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... not work effectively for the low NO concentrations (e.g., < 50 ppm), high exhaust gas flow rates, and low gas temperatures characteristic of **Jet** Engines Test Cells (JETCs). This project is currently evaluating non-thermal plasma (NTP) technologies for treating jet-engine exhaust. In the past, economic ... technology and do so at competitive costs. In this White Paper, we have analyzed the costs of some NTP technologies for jet-engine **emissions** control. In some cases, these analyses have shown lower exhaust-gas treatment costs for NTP systems compared to a baseline standard de-NOx technology like ...

[Reactions of Oxides of Nitrogen \(NOx\) Leading to the Formation of Nitric Acid \(HNO3\) in Non-Thermal Plasmas \(NTPs\): White Paper for the Strategic Environmental Research and Development Program \(SERDP\) Compliance Project CP- 1038, "Development of Non-Therm](#) Aug 20, 1998 21 pages
Authors: [Louis A. Rosocha](#); [Andrzej W. Miziolek](#); [Michael J. Nusca](#); [J. -s. Change](#); [John T. Herron](#); [LOS ALAMOS NATIONAL LAB NM](#)

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... of order 10's - 100's eV per decomposed pollutant molecule, thus showing the benefits of selective chemistry. It has been decided that the primary targets for our work on NTP technology will be **jet** engine test cells (JETCs) and cruise missile test cells (CMTCs), which are stationary sources of air **emissions**. Therefore, we can exercise the option of converting the emitted NOx to HNO3 (or related acids) and scrub out the acid. In this white paper, we will show the ...

[Experimental and CFD Studies of Non-Thermal Plasmas for NOx Control](#) 1998 6 pages
Authors: [M. J. Nusca](#); [P. A. Saguear](#); [A. W. Miziolek](#); [ARMY RESEARCH LAB ABERDEEN PROVING GROUND MD](#)

[Full Text](#)

... a promising technology for the destruction of various toxic gases entrained in air streams. One challenging example of the need for hazardous gas control is the **jet** engine test cell (JETC) facility where very large amounts of NO(x)s are emitted along with various hydrocarbon gases on an episodic basis. The high flow rates as well as the wide dynamic range of pollutant concentrations make this a particularly difficult problem for **emissions** control. In order to investigate the ability of NTPs to dissociate NO(x)s, will be entrained in an airstream and passed through the reactor. We ...

[AFOSR Focused Research Initiative: Low-Emissions, High-Performance Gas Turbine Engines. Addenda A through E](#) Aug 1999 253 pages
Authors: [H. Mongia](#); [J. Peters](#); [R. Lucht](#); [R. Dibble](#); [J-y Chen](#); [GE AIRCRAFT ENGINES CINCINNATI OH](#)

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... design and demonstrate an innovative, low-emissions, high- performance gas turbine combustion concept. Fundamental experiments were conducted for (1) a novel coaxial **jet** flame. (2) a liquid-fuel/air mixing device of radial swirlers (swirlcup). and (3) a natural gas/air mixer using ... axial swirlers (DACRS). Parallel activities included: (1) formulation and validation of semianalytical mechanistic models for predicting performance and **emissions** of combustors. (2) improved second-order closure based turbulent combustion models. (3) vortex methods, 4) large-eddy simulation with linear eddy ...

[Fuel-Air Injection Effects on Combustion in Cavity-Based Flameholders in a Supersonic Flow \(Postprint\)](#) Jul 2005 14 pages
Authors: [William Allen](#); [Paul I. King](#); [Mark R. Gruber](#); [Campbell D. Carter](#); [Kuang-Yu Hsu](#); [AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH DEPT OF AERONAUTICS AND ASTRONAUTICS](#)

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... supersonic flow. Cavity- based fuel injection and flameholding offer an obstruction-free flow path in hydrocarbon-fueled supersonic combustion ramjet (scram **jet**) engines. Additionally, this study included characterization of the operational limits (i.e., sustained combustion limits) over a variety of fuel and ... collect planar distributions of the OH radical at various axial locations within the cavity under different flow conditions. A high-speed **emissions** camera was used to evaluate the combustion across the cavity. Direct injection of both fuel and air provided additional capability to tune ...

Total Results: 48

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50