About the Commentary: The Commentary addresses selected issues within the Code of Conduct to elaborate on their meaning, provide interpretive guidance, and suggest ways of adopting the Code of Conduct. It is intended primarily for implementers, policy administrators, aviation association management, and pilots who wish to explore the Code in greater depth, and will be updated from time to time. Please send your edits, errata, and comments to <PEB@secureav.com>. Terms of Use are available at <http://secureav.com/terms.pdf>.

COMMENTARY TO
AMCC V.a – *ENVIRONMENTAL ISSUES*

a. recognize and seek to mitigate the environmental impact of aircraft operations,

> **A future in which aviation exists in harmony with the natural and human environment is possible, but cannot occur without better knowledge and understanding of existing and future environmental impacts and the opportunities for mitigating or avoiding them.**
>
> Transportation Research Board, Nat'l Academies[1]

> **Environmental protection is valued and is everyone's responsibility.**
>
> Jane F. Garvey, FAA Administrator[2]

Introduction – Reducing pollution[3] caused by General Aviation activities will benefit pilots, passengers, and society as a whole. Environmental problems such as ground, air, water[4] and noise[5] pollution have constrained flight operations and even closed airports. Indeed, such problems could compromise the future of GA by producing huge recoveries in environmental lawsuits, not typically covered by aviation insurance.[6] Although noise abatement near airports has received much attention (more than any other GA environmental issue[7]), it requires greater emphasis still.[8] "Of all environmental issues, noise pollution is the one that *all* GA pilots can do something about on virtually *every* flight."[9] Because other environmental impacts of GA have garnered less attention, they are highlighted in the Commentary to emphasize their significance and educate adopters about their impact. Socioeconomic issues may also affect environmental policy for aviation including, for example, "environmental justice."[10] At very least, controlling pollution from GA operations will protect pilots and passengers from exposure to toxins. Keeping our GA environment clean is the continuing responsibility of all GA pilots.

Effective responses to environmental concerns in aviation often require complex and sustained interaction among all concerned, including aircraft manufacturers, airlines, airport management, environmental scientists, government, pilots, instructors, local communities, and the public at large. Nonetheless, through the thoughtful exercise of responsible practices, most environmental issues are manageable. GA would benefit by actively developing and adhering to reasonable voluntary environmental practices.[11]

The GA community makes some contributions to environmental research and protection.[12] Still, despite the great importance of environmental matters, GA culture has not traditionally considered them a high priority.[13] Leadership in this area is developing and should help secure greater public trust of GA.

Organization and Scope – The commentary to AMCC V. addresses GA environmental issues as follows:

- AMCC V.a provides a general introduction to environmental issues.
- AMCC V.b addresses emissions from fuel, oil, and other chemicals and wastes.
- AMCC V.c considers noise affecting wildlife, parks, preserves, and wilderness.
- AMCC V.d focuses on noise affecting people and populated areas.

There is inherent overlap among these issues, and this is reflected in this commentary. Although it focuses primarily on piston-engine chemical and noise emissions, much of the commentary is also relevant to small turbine-powered aircraft.[14] The commentary also introduces important environmental rules and policy and concludes with a discussion of hazardous material (HazMat) issues. Importantly, these issues are dynamic, interrelated, and evolving.[15]

Environmental Considerations Unique to GA – Several characteristics of GA operations (piston-engine and small turbine-powered aircraft flown primarily for personal and business use, air taxi and aerial work[16]) give it a unique environmental profile:[17]

- intensive use of small airports, which often lack environmental resources and oversight
- few resources available in many GA airports to address hazardous emissions
- limited pilot training in and awareness of environmental issues
- frequent flight operations at low altitudes and in close proximity to residential and other noise-sensitive areas
- widespread use of leaded fuels[18]
- aircraft with few pollution mitigation systems[19]
- broad use of discretionary flight paths
- restricted hours of operation, runways, and departure/approach options
- risks of transporting invasive species[20]

Environmental Policy and Law – Environmental policy and law play a vital role in environmental protection. They are considered here to help familiarize pilots with permissible and prohibited conduct in terms of environmental impact and to serve as a resource for further study. Pilots should survey applicable regulations and reflect on their own flying activities, focusing on generation of noise, emissions, and wastes and how to satisfy or exceed regulatory requirements and otherwise contribute to a cleaner and quieter environment. However, pilots may find that a review of environmental policy and law fails to provide clear guidance. As a practical matter, the lesson here is that environmentally responsible conduct transcends the scope of regulation and requires thoughtful, consistent, and creative initiative.[21] The *Environmental Issues* Commentary to AMCC Sections V.b-d offers some responsive suggestions.

Early environmental cases (predating environmental legislation) typically concerned "local" noise matters litigated under the common law[22] theory of *nuisance*.[23] In contrast, many contemporary cases touch upon "broader environmental issues" of regional, national, and even international import and involve environmental advocacy organizations with extensive scientific, legal, and policy expertise.[24] Today, environmental matters in aviation are governed by a diverse body of international, federal, regional, state, and local authorities and are affected by numerous interest groups and stakeholders.

Federal Policy and Law – The National Environmental Policy Act of 1969 (NEPA) serves as the core national charter for environmental protection in the United States.[25] It was enacted because of "the profound impact of man's activity on the interrelations of all components of the natural environment."[26]

> [NEPA] declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to *use all practicable means and measures* . . . to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.[27]

It further directs all federal agencies to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed [environmental impact] statement by the responsible official."[28] NEPA is strictly construed[29] and greatly influences the national environmental agenda. NEPA also precipitated the creation of the U.S. Environmental Protection Agency (EPA).

The Clean Air Act (CAA)[30] is the most significant U.S. legislation governing air pollution. It requires the EPA to develop and determine compliance with air quality standards such as the National Ambient Air Quality Standards (NAAQS).[31] The CAA vests authority in the EPA to promulgate aircraft emission and other aviation-specific environmental standards in consultation with the FAA.[32] The FAA has developed directives to facilitate compliance with NEPA[33] and the CAA,[34] among other environmental mandates.[35] Regulations promulgated under NEPA, however, have material limitations.[36] NEPA's impact on GA is considered further in the Commentary to AMCC V.b.

State and Local Governments – State and local governments play a critical role in environmental protection. States must meet or exceed the requirements of various federal environmental laws—such as the CAA.[37] Typically they enjoy considerable flexibility in how they can achieve such compliance.[38] For example, in *non-attainment areas*[39] associated with some major airports, affected states (as well as some county and municipal governments and local authorities, including airport authorities) have taken significant and uniquely tailored remedial initiatives[40] in response to both federal and other requirements. Furthermore, although the CAA prohibits states from establishing aircraft emission standards,[41] they can attempt to mitigate aviation-related pollution by offering financial incentives to replace dirty aircraft, imposing emissions-based landing fees (charging higher fees for dirtier aircraft), and placing certain limits on airport operations (by limiting hours of operation or imposing restrictions on engine idling).

The issue of environmental protection is not summarily preempted by federal mandate.[42] For example, *general conformity* requirements under the CAA[43] require federal agencies to conform to appropriate state implementation plans. Also, many states have effectively enforced their own state rules against GA polluters.[44] Additionally, there has been a rise in interstate environmental accords. Accords are typically established when federal rules fail to provide sufficient environmental protections or when interstate cooperation provides the most effective results.[45]

International Rules – International environmental research and regulation related to aviation is coordinated primarily by the International Civil Aviation Organization (ICAO)[46]—through its Committee on Aviation Environmental Protection (CAEP)[47]—in close cooperation with the process established by the United Nations Framework Convention on Climate Change (UNFCCC)[48] and initiatives by other governmental and nongovernmental organizations (NGOs).[49] Although ICAO's efforts to harmonize international standards primarily affect commercial airlines, they also have some impact on GA.

International environmental initiatives such as the *Kyoto Protocol*[50] include measures to reduce emission inventories, including emissions from aviation, and underscore an increasing global commitment to addressing climate change. Although lack

of consensus has impeded this particular initiative,[51] international environmental initiatives and organizations will likely exert greater influence on GA in the future.

Voluntary Stakeholder Initiatives – Voluntary stakeholder initiatives to protect the environment have been undertaken by all levels of government in cooperation with the private sector.[52] Many of them take a market-based approach to reducing emissions. In 1993, the U.S. Government Accountability Office recommended "that the FAA develop a strategic framework that examines . . . options for achieving emission reductions; and specifies the roles of other government agencies *and the aviation industry* in developing and implementing emission reduction programs."[53]

Responding to environmental and public health organizations frustrated over the inability to regulate aviation emissions effectively at the state and local level, the EPA and FAA signed a Memorandum of Understanding[54] to identify new ways to reduce such emissions. The MOU initiated a stakeholder process to address various emissions issues—with the goal of forestalling excessive and nonuniform regulation. Following a temporary suspension after 9/11, some of these initiatives "fell apart due to financial difficulties and complexity . . . [and] the parties walked away."[55]

Nonetheless, EPA asserts that it "will continue to pursue voluntary initiatives to reduce the use of lead in aviation gasoline and collect information as possible."[56] Although focused on commercial airports, the VALE (voluntary airport low emissions) program provides a concrete example of a functional stakeholder initiative.[57] The extent to which voluntary stakeholder initiatives are successful will determine whether the EPA and FAA retain a commitment to and enthusiasm for this approach to reducing emissions. Relevant stakeholder initiatives are discussed further in the Commentary to AMCC V.b-d.

Environmental Education and Compliance – Because these issues in aviation are complex and far-reaching, environmental education is sorely needed in GA. As one flight club manager explains, "The primary responsibility to increase environmental sensitivity lies [with] the flight instructor community, to seek out and develop best practices and [lay] the groundwork for . . . pilots to retain [a] heightened sense of awareness [about environmental issues]."[58] One prominent flight instructor implores that "Every CFI should stress the importance of treating fuel as a public toxin, and of remaining aware that most ground-bound people consider aircraft noise annoying."[59] Despite such views on the part of some GA trainers, the FAA's Practical Test Standards do not materially address environmental stewardship.[60] Although the PTS should neither drive nor constrain the design of aviation curricula,[61] the limited attention to environmental issues in the current set of Standards offers CFIs little incentive to learn and teach environmental responsibility—thereby further distancing environmental issues from the consciousness, culture and practices of GA pilots.

The following suggestions could advance environmental education and compliance within GA:

- Cover environmental issues in primary and recurrent flight training curricula[62]
- Develop *measurable guidance*, including environmental awareness flyers, tips, and checklists for distribution to aviators[63]
- Learn to identify used oil and contaminated fuel collection points and spill kit locations at airports[64]
- Understand and adhere to environmental terms contained in tie-down, hanger lease, aircraft rental, and flight instruction agreements[65]
- Train pilots to understand and adhere to applicable environmental rules

- Volunteer to help develop or improve effective airport environmental training programs, facilities, and signage

Dangerous Goods and Hazardous Materials – Dangerous Goods and Hazardous Materials (DG/HazMat) are articles or substances that can pose a significant risk to health, safety, or property. One need only reflect on the fatal crash of ValuJet Flight 592 from an in-flight fire and the resulting loss of control of the aircraft[66]—arising out of improper handling of unexpended oxygen generators and noncompliance with HazMat rules and practices[67]—to appreciate the importance of managing these substances correctly. Other aviation DG/HazMat incidents have resulted in serious safety risks or environmental degradation.[68] Because the FAR contain no HazMat training or handling requirements for Part 91 operations that are not involved in commerce, pilots operating under Part 91 should voluntarily acquire sufficient knowledge of DG/HazMat to ensure safe flight operations. Reviewing and adhering to the HazMat requirements in Part 135,[69] to the extent practicable, would be a reasonable approach.[70] The Part 135 requirements include, for example: reviewing the types of hazards posed by transported materials; proper labeling, handling, loading, and storage of them; and appropriate incident reporting when mishaps occur.[71] Ground and flight operations require separate considerations and focus. Passengers should be queried about potential hazardous materials they may be carrying onto the aircraft if for no other reason than safety of flight.

Source: U.S. Dept. of Transportation

Many hazardous materials can affect a pilot's ability to fly safely, including, for example, toxics and reactives such as flares. The transportation and fueling of avgas via portable containers is particularly hazardous due to risks of static spark generation caused by improper grounding.[72] Many pilots do not recognize that dry ice is frozen carbon dioxide; because it is heavier than air, it may displace oxygen in a confined space—such as an aircraft cabin—and create chemically-induced hypoxia.[73] Even an altitude of 10,000 feet MSL can reduce pressure on a container enough to cause a leak of solvents or chemicals. It is generally best to keep such products in their original containers, because such containers are usually safer, although not necessarily certified for flight. For the foregoing reasons, pilots should exercise extreme caution should it be necessary to transport hazardous materials by air.

Battery and battery-powered equipment malfunction (e.g., short-circuit and resulting heat generation) is the largest category of DG/HazMat incidents. Incidents resulting from battery acid spills occur less frequently. Many of these incidents involve batteries that are exempt from DG/HazMat regulations as long as they are protected from short-circuit.[74]

Pilots should pay particular attention to passengers and their baggage.[75] Pilots should be mindful that the extreme dangers of some materials are unfamiliar to most passengers. Therefore passengers should be briefed accordingly.[76] An AMCC *Sample Recommended Practice* provides, "When carrying passengers who are not well known to the pilot, examine passenger carry-on bags for dangerous materials."[77]

CODE EXAMPLES:[78]

- "[A]dopt reasonable, efficient and generally affordable methods of environmental impact reduction [and] co-operate on the development of environmental guidelines for each general aviation discipline." *Joint Declaration*, Europe Airsports, Fédération Aéronautique Internationale, & International Council of Aircraft Owners and Pilots Associations[79]

- "Affiliates must be sensitive to the environmental concerns of the public and take steps to educate both the public and their members about the relative merits of their mutual concerns." *Policy Manual*, International Council of Aircraft Owners and Pilots Associations[80]
- "Observ[e] this code of conduct. Beginning with flight preparation, continuing throughout the flight and until the aircraft is put back into the hangar, pilots must strive to protect the environment." *Green Policy Checklist*, Canadian Owners and Pilots Association[81]
- "The responsibility for environmental awareness in air sports lies primarily with the individual air sport enthusiast." *Draft Code of Conduct: Air Sports and the Environment*, Fédération Aéronautique Internationale[82]
- "All laws and regulations issued by the . . . *Environmental Protection Agency* . . . are to be followed at all times." *Code of Business Conduct and Ethics*, ATA Airlines, Inc.[83]

DRAFTING CONSIDERATIONS:

- ✓ **Dangerous Goods and Hazardous Materials** – Placing DG/HazMat in this section of the commentary was a compromise insofar as these issues also relate to AMCC I (concerning regulations and general operational procedures) and AMCC IV (concerning security). In balance, the environmental implications of DG/HazMat outweighed the other options and support its placement herein. Nonetheless, as an alternative, it may be placed elsewhere. Implementers are free to include such a provision in their implementation of the AMCC.

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[1] Daniel T, Wormhoudt, *Introduction to Transportation Research Board of the National Academies, Critical Issues in Aviation and the Environment*, Transportation Research Circular No. E-C069 (Aug. 2004), *available at* <http://gulliver.trb.org/publications/circulars/ec069.pdf>.

[2] *Administrator's Policy Statement on Pollution Prevention* (June 2000), *available at* <http://www.tc.faa.gov/logistics/envpolst.doc>. *See* Marion C. Blakey, *Foreword in Prevention, Control, and Abatement of FAA Environmental Pollution*, FAA Order No. 1050.10C (Sept. 13, 2004), *available at* <http://www.faa.gov/regulations_policies/orders_notices/media/1050_10C.pdf> (stating the FAA's "mission to be the national and international leader in aviation environmental issues").

[3] Air pollution is defined as a change in the natural composition of the atmosphere caused by both natural and anthropogenic sources. Among other characteristics, aviation emissions are the only significant anthropogenic source of pollution in the upper troposphere and lower stratosphere. G.J.J. RUIJGROK & D.M. VAN PAASSEN, ELEMENTS OF AIRCRAFT POLLUTION ix, 1 (Delft Univ. Press 2005).

[4] *See* Commentary to AMCC V.b (addressing air, ground and water pollution).

[5] *See* Commentary to AMCC V.c and V.d (addressing environmental noise issues).

[6] Consider, for example, the USAIG's general aviation "All-Clear" aviation insurance policy's standard *Environmental Disturbance and Pollution Exclusion* which excludes coverage for personal injury or property damage/loss "arising out of the actual, alleged or threatened discharge, dispersal, seepage, mitigation, release or escape of pollutants"—whether intentional or accidental." (copy on file with the author). "Environmental disturbance" includes noise, vibration, electro-magnetic radiation, and interference by over-flight. *Id*. *See, e.g.*, Commentary to AMCC V.b. (citing a consent judgment between the Florida Dep't of Environmental Protection and Embry-Riddle Aeronautical University where ERAU was fined $24,999 resulting from illicit fueling practices).

The GA community may also be affected indirectly by FBO and airport-tenant pollution. *See, e.g.*, William S. Soldan, Aero Alliance Insurance Services, *Beware of the Environmental Liability Exposures at Airports* (Oct. 5, 2005), *available to NBAA members at* <http://web.nbaa.org/member/ops/airports/liability200510.php?NBAAURI=/member/ops/airports/liability200510.php&OVERRIDE=1> (citing a Miami Int'l Airport "Superfund" environmental lawsuit concerning pollution from chlorinated solvents used for cleaning and degreasing aircraft engine metal parts and surfaces – where remedial costs were estimated at more than $400,000,000 and involved more than 100 potential responsible parties); *Miami-Dade County v. Advance Cargo Services, Inc., et al.*, No. 01-8758 CA(25), Sup. Ct., Fla. *See also U.S. Dept. of Justice, Summary of Litigation Accomplishments fiscal Year 2004 – Environmental and Natural Resource Division, at* <http://www.usdoj.gov/enrd/Electronic_Reading_Room/sumlitaccomp2004.htm> (regarding *Miami-Dade County, Florida v. United States*, 345 F.Supp.2d 1219 (U.S. Dist. Ct., S.D., Fla. 2004). The "Superfund" (The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601-9675) is explained at <http://www.epa.gov/superfund/action/law/cercla.htm>.

[7] *See* Paul Stephen Dempsey, *Trade & Transport Policy in Inclement Skies – The Conflict Between Sustainable Air Transportation and Neo-Classical Economics*, 65 J. AIR L. & COM., 639, 646-47 (2000), *available at* <http://www.smu.edu/lra/Journals/JALC/Overview.asp>.

[8] Interview with John King, King Schools, in São Paulo, Braz. (Sept. 30, 2002).

[9] Email from Prof. Dale DeRemer, Ph.D. (Apr. 25, 2006).

[10] Environmental justice has been defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." EPA, Environmental Justice Webpage, *at* <http://www.epa.gov/compliance/basics/ej.html>. *See Federal Actions to Address Environmental Justice*, Exec. Order No. 12,898, 59 Fed. Reg. 7,629 (Feb. 16, 1994), *available at* <http://www.hud.gov/offices/fheo/FHLaws/EXO12898.cfm>; *Department of Transportation (DOT) Order to Address Environmental Justice*, 62 Fed. Reg. 18,377 (Apr. 15, 1997), *available at* <http://www.faa.gov/airports_airtraffic/airports/environmental/policy_guidance/media/fr_vol62_no72.pdf>; *cf.*, GAO, *Hazardous and Nonhazardous Wastes: Demographics of People Living Near Waste Facilities*, Report No. GAO/RCED-95-84 (1995), *available at* <http://www.gao.gov/archive/1995/rc95084.pdf> (minorities and low income people not disproportionately represented near most such hazards).

[11] Nonetheless, it is recognized that total emissions by GA aircraft are miniscule compared to those of the airlines and other transportation sectors.

[12] *See, e.g.*, GA Serving America, *Environmental Protection*, *available at* <http://www.gaservingamerica.com/also_working_for/environmental.htm> (highlighting environmental service by GA, including atmospheric sampling & research, surveying & surveillance, damage assessment, evidence gathering, and coastal border patrol).

[13] *See, e.g.*, AOPA Air Safety Foundation, *Fuel Awareness*, Safety Advisor, Operations and Proficiency No. 5, p. 11 (2002), *available at* <http://www.aopa.org/asf/publications/sa16.pdf> (AOPA takes no position regarding the propriety of dumping fuel samples: "There is much debate as to how fuel samples should be disposed of . . . the debate rages on and will not be resolved in this Safety Advisor." *Id.*). Nonetheless, there are many examples of aviators as good stewards of the environment. *See generally* LightHawk, *at* <http://www.lighthawk.org> (The largest and oldest volunteer-based environmental aviation organization in North America). *See also* AMCC III.c (urging pilots to avoid complacency).

[14] Small turbine aircraft present some unique environmental challenges (such as difficulty in applying efficient burner technologies). *See* Commentary to AMCC V.b (providing an introduction to small turbine environmental issues).

[15] The dynamic nature of how we, as a society, address environmental issues relating to GA is due to, among other causes, advances in the environmental sciences and technology and to changes in the political landscape. For a revealing look at the tumultuous (and arguably failed) interactions between the scientific,

business, and government communities regarding environmental toxins (cromium-6, specifically), *see* Peter Waldman, *Study Tied Pollution to Cancer; Then Consultants Get Hold of It*, WALL ST. J., Dec. 23, 2005, at p. A1, *available at* <http://pqasb.pqarchiver.com/wsj/access/947189821.html?dids=947189821:947189821&FMT=ABS&FMTS=ABS:FT&date=Dec+23%2C+2005&author=Peter+Waldman&type=91_1996&desc=Toxic+Traces%3A+New+Questions+About+Old+Chemicals>. Similarly, the EPA recognizes that it must balance noise and emissions regulations with economic, technological, and safety and performance considerations, and that these issues are all interrelated. *See* EPA, *Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures*, Final Rule, Nov. 9, 2005, p. 51, *available at* <http://www.epa.gov/nonroad/aviation/aircraft-frm.pdf>.

[16] "Aerial work" is defined as "an aircraft operation in which an aircraft is used for specialized services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement, etc." Int'l Business Aviation Council, Ltd., *at* <http://www.ibac.org/Library/ElectF/saft/awgas_mar8.htm>.

[17] *See generally* Canadian Owners and Pilots Ass'n, *Green Policy Checklist*, *available at* <http://www.copanational.org/non-members/index.htm/>.

[18] *See* Commentary to AMCC V.b (addressing avgas) (GA is the sole remaining market for leaded fuel).

[19] Contributing to GA's environmental challenges are its aging fleet (compared to the airlines) and its smaller, cheaper aircraft for which—it is claimed—effective environmental designs and systems are less feasible. Nonetheless, STC'd after-market systems—including oil traps, better mufflers and reduced-noise propellers (e.g., four-bladed props)—may contribute to more environmentally responsible aircraft. *See* Commentary to AMCC V.b-d. (addressing after-market systems to mitigate aircraft pollution).

[20] "(f) 'Invasive species' means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health." *Invasive Species*, Exec. Order No. 13,112 (Feb. 3, 1999), 64 Fed. Reg. 6,183-6,186, *available at* <http://www.invasivespeciesinfo.gov/laws/execorder.shtml#sec1> (intended to prevent the introduction of invasive species as well as to minimize and control economic, ecological, and human health impacts of invasive species). "Invasive species" is also defined to mean "a species, including its seeds, eggs, spores, or other biological materials capable of propagating that species, that is not native to the ecosystem, and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." CAL. FISH AND GAME Code, § 6950, *available at* <http://caselaw.lp.findlaw.com/cacodes/fgc/6950-6957.html>. *See generally* Exec. Order 13112, *Invasive Species*, 64 Fed. Reg. 6,183 (Feb. 8, 1999); U.S. Dept. of Agriculture, National Invasive Species Information Center, *at* <http://www.invasivespeciesinfo.gov> (provides a state-by-state list of rules and activities related to invasive species); <http://www.hear.org/AlienSpeciesInHawaii/articles/browntreesnake_worldconservation.htm> (land plane transporting invasive species); *cf.*, Seaplane Pilots Association, *Seaplane Environmental Issues*, *available at* <http://www.seaplanes.org/advocacy/environment.pdf> (provides a good discussion of seaplane noise but as of yet no mention of invasive species). *See* YVONNE BASKINM, A PLAGUE OF RATS AND RUBBERVINES—THE GROWING THREAT OF SPECIES INVASION (Island Press/Shearwater Books 2002); Dep't of Transp't, *Voluntary Guidelines on Recreational Activities to Control the Spread of Zebra Mussels and Other Aquatic Nuisance Species*, 65 Fed. Reg. 19,953-19,957 (2002), *available at* <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2000_register&docid=fr13ap00-125>; United Nations Environmental Programme, *Invasive Alien Species: Further Clarification of The Gaps and Inconsistencies in The International Regulatory Framework*, Note by the Exec. Sec'y, Ad Hoc Technical Expert Group on Gaps and Inconsistencies in The Int'l Regulatory Framework in Relation to Invasive Alien Species, Doc. UNEP/CBD/AHTEG/IAS/1/2, 15 April 2005, *available at* <http://www.unep.org/>, *also available at* <http://www.biodiv.org/doc/meetings/ais/aisteggi-01/official/aisteggi-01-02-en.doc>.

Query whether airline or GA operations present a greater potential threat of transporting invasive species. Of course, the profile of airline and GA operations vary. Arguably GA land-based aircraft have greater contact with vegetation and pests to the extent that some fly into unimproved fields, and bodies of water

(the seaplane fleet is predominantly GA), whereas airlines tend to fly greater distances, potentially transporting more exotic pests. One policy analyst asserted, "I don't think that anyone has thought about it." Telephone Interview with Arnold Konheim, Sr. Policy Analyst, Office of the Sec'y, Dep't of Transp. (June 9, 2006).

[21] *See, e.g.*, Commentary to AMCC V.b (addressing proper disposal of used oil – where applicable law and regulation except individuals and small generators). And, consider the extent to which the FAR/AIM fail to address the environmental impacts of its provisions. *See, e.g.*, AIM 6-3-5, *Fuel Dumping* (includes no environmental considerations); FAR 91.15, *Dropping objects* (prohibits drops that create a "hazard to person or property" but does not mention environmental considerations). Consider that many environmental regulations regulate businesses and not individuals.

Ed. – The following is included with a measure of humor: *See Ball of ice crashes through roof of home*, SAN JOSE MERCURY, Jan. 22, 2003, p. 3B ("The Federal Aviation Administration [said] the ice was probably from a leaky airplane bathroom . . . . Jerry Johnston of the FAA said in his 12 years with the agency, it's the fourth report of such waste falling from a plane"). "SANTA CRUZ, Calif. (AP) – A Santa Cruz man won a suit against American Airlines alleging that one of the company's planes released two chunks of toilet waste, known euphemistically as blue ice, onto the skylight of his boat. After the chunks came crashing down and damaged his boat, Ray Erickson tracked down the plane – American Airlines Flight 1950 – and sued in small claims court . . . . A judge ordered the airline to pay him $3,236 - almost the entire amount Erickson had sought. Mike Fergus, a spokesman for the Federal Aviation Administration, was surprised at the decision. 'I'll be darned,' said Fergus, who hadn't heard of any similar suits succeeding before." Associated Press, *Calif. Man Wins Plane Toilet Ice Lawsuit*, June 15, 2003.

[22] Law based upon extensive non-statutory law reflecting precedent derived from judgments by prior judicial decisions.

[23] This required the courts to "strike a balance between the property interests of the landowner and the demands of a growing industry highly important to the public." PROSSER & KEETON, TORTS § 13, at p. 81 (5TH ed. 1984). Other traditional legal theories invoked included trespass and wrongful "taking". *Id*.

[24] Andrew C. Mergen, Esq., *The Challenging Nature of Airport Environmental Litigation*, THE AIR & SPACE LAWYER, Vol. 18 (Winter 2004), p. 20-23.

[25] As amended by Pub. L. 91-190, and 94-52 (1975), 42 U.S.C. § 4321, *et seq*., *available at* <http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm>. *See* FAA, Airports Environmental Program Website, *at* < http://www.faa.gov/airports_airtraffic/airports/environmental/> (assisting in the implementation of NEPA); FAA, Aviation Policy, Planning & Environment Website, *at* <http://www.faa.gov/about/office_org/headquarters_offices/aep/> (presenting The Office of Environment and Energy which develops, recommends, and coordinates environmental and energy aviation).

[26] NEPA, *Id*. *at* § 101 [42 U.S.C. § 4321].

[27] NEPA, *Id*. (emphasis added).

[28] § 102 [42 U.S.C. § 4332], *available at* < http://ceq.eh.doe.gov/Nepa/regs/nepa/nepaeqia.htm> (including a statement of unavoidable adverse environmental effects and alternatives, among other considerations).

[29] *Calvert Cliffs' Coordinating Committee, Inc. v. United States Atomic Energy Com'n*, 449 F.2d 1109 (D.C. Cir. 1971) (requiring a "strict standard of compliance" under NEPA).

[30] 42 U.S.C. § 7401 et seq. (1970), *available at* <http://www.epa.gov/oar/caa/caa.txt>.

[31] NAAQS, considered the centerpiece of the CAA, addresses ozone, carbon monoxide, particulate matter, nitrogen dioxide, sulfur dioxide, and lead. Clean Air Act Amendment 1990, Title I – Provisions for Attainment and Maintenance of National Air Quality Standards, § 101(d)(1), Nov. 15, 1990, *available at* <http://www.epa.gov>.

[32] EPA must consult with the FAA before proposing or promulgating emission standards, 42 U.S.C. § 7571(a)(2)(B)(i).

[33] *See* FAA, Order 1050.1E (June 2004), *available at* <http://www.epa.gov/fedrgstr/EPA-GENERAL/1999/November/Day-19/g30266.htm>. *See also* FAA, Order 5050.4B, *General NEPA Requirements and Responsibilities* (Dec. 2004), *cited in* <http://www.faa.gov/arp/environmental/5050_4B/CH2.pdf> ("FAA is responsible for applying NEPA to its particular programs and actions. To do this, CEQ regulations allow FAA to adopt its own implementing procedures to supplement these regulations. FAA has done this in Order 1050.1E [Change 1]. Order 5050.4B supplements FAA Order 1050.1E by providing detailed guidance on how FAA integrates NEPA into the planning and decision-making for FAA's Airports Improvement Program (AIP)."); and <http://www.faa.gov/regulations_policies/orders_notices/media/10501ECHG.pdf>.

[34] CAA § 231(a)(2) authorizes the EPA Administrator to "issue proposed emission standards applicable to the emission of any air pollutant from any class or classes of aircraft or aircraft engines which in his judgment causes, or contributes to, air pollution which may reasonably be anticipated to endanger public health or welfare." 42 U.S.C. § 7571; and, to make appropriate modifications of such standards. CAA § 231(a)(3).

[35] *See generally* EPA, *Major Federal Environmental Laws*, *available at* <http://www.epa.gov/epahome/laws.htm>. *See also* The Federal Aviation Act of 1958, 49 U.S.C. § 44715 (catalyzed FAA's issuance of the first noise standards); The Water Pollution Control Act, 33 U.S.C. App § 1251; The Clean Water Act of 1977, 33 U.S.C. § 1251, et seq. (1977); Vision 100—Century of Aviation Reauthorization Act, Pub. L. No. 108-176 (Dec. 12, 2003); Lynne Pickard, FAA, *Vision 100*, *at* <http://www.techtransfer.berkeley.edu/aviation04downloads/Pickard.pdf> (slide presentation summarizing the Century of Aviation Reauthorization Act); The Hazardous Materials Transportation Act, 49 U.S.C. § 5101, et seq., *available at* <http://www4.law.cornell.edu/uscode/html/uscode49/usc_sup_01_49_10_III_40_51.html>; and The Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6928(a) and (g), *available at* <http://www.law.cornell.edu/uscode/html/uscode42/usc_sup_01_42_10_82.html> (the major Federal legislation on waste disposal). *See infra* text accompanying notes 66-77 (re: hazardous materials transport).

[36] For example, both aircraft and airports fail to satisfy the definitions of source types regulated under CAA § 112 (on Hazardous Air Pollutants ("HAPs")). HAPs are "pollutants known or suspected to cause cancer or other serious health problems, or cause adverse environmental and ecological effects." EPA, *Fact Sheet – The Air Toxic Strategy* (Jan. 2003), *available at* <http://www.epa.gov/ttn/atw/urban/strategyfs0303.pdf>. *See* FAA, *Selected Resource Materials and Annotated Bibliography on the Topic of Hazardous Air Pollutants (HAPs) Associated with Aircraft, Airports, and Aviation*, Prepared by URS Corp., p. 12 (July 1, 2003). *See* Commentary to AMCC V.b (explaining that airports and aircraft are treated in the National Air Toxics Program as "complex facilities" rather than comprehensively under the CAA).

[37] This is known as a "cooperative federalism regulatory" scheme. Philip J. Weiser, *Federal Common Law, Cooperative Federalism, and the Enforcement of the Telecom Act*, N.Y.U. LAW REV. (Nov 2001), *available at* <http://lawweb.colorado.edu/profiles/pubpdfs/weiser/CoopFederalism.pdf>.

[38] Although "unfunded mandates" from the Federal government can place untenable obligations on the States, which are increasingly ill-equipped, financially, to satisfy them.

[39] A *non-attainment area* is a designated locality where air pollution levels either persistently exceed the NAAQS (*see supra* note 31) or contribute to ambient air pollution in a nearby area such that applicable standards for carbon monoxide, lead, ozone, particulate matter, or sulfur dioxide are not met. (There are no nonattainment listings for nitrogen dioxide.) "Nationwide, there are approximately 159 million people living in 126 areas [and representing 474 counties] that are designated as not attaining the 8-hour ozone NAAQS . . . . ." U.S. EPA, *Air Quality Designations and Classifications for the 8-hour Ozone National Ambient Air Quality Standards; Early Action Compact Areas with Deferred Effective Dates*, Final Rule, 69 Fed. Reg. 23,858 (Apr. 30, 2004) [to be codified at 40 C.F.R. § 81]. *See* EPA, *Clean Air Ozone Rules Of 2004*, *at* <http://www.epa.gov/ozonedesignations/finrulefs.htm> (explaining the Final Rule).

Approximately 88 million people live in 39 areas and 208 counties designated as not attaining the particulate matter air quality. The NAAQS and a list of affected counties are listed in Docket No. OAR-2002-0030, Doc. No. OAR-2002-0030-0209). *See generally* <http://www.epa.gov/ttn/naaqs/>. And yet, these numbers exclude tens of millions of people living in areas threatened by a significant future risk of nonconformance to ozone or PM standards. Federal, state, and local governments are working to bring ozone and PM levels into compliance with the NAAQS. EPA, *Control of Air Pollution from Aircraft and Aircraft Engines; Emission Standards and Test Procedures*, Final Rule (Nov. 2005), p. 26, *available at* <http://www.epa.gov/nonroad/aviation/aircraft-frm.pdf>. Most of the 50 largest U.S. airports are in ozone nonattainment areas.

The NAAQS 8-hour ozone standard is met when the fourth highest daily maximum 8-hour average ozone concentration measured over a 3-year period is less than or equal to 0.084 parts per million. EPA, *National Ambient Air Quality Standards for Ozone*; Final Rule. 62 Fed. Reg. 38,855 (July 18, 1997), *available at* <http://www.epa.gov/fedrgstr/EPA-AIR/1997/July/Day-18/a18580.htm>. EPA, *Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard--Phase 1*, Final Rule, 69 Fed. Reg. 23,951 (Apr. 30, 2004), *available at* <http://www.epa.gov/fedrgstr/EPA-AIR/2004/April/Day-30/a9153.htm>.

See generally Jake Schmidt, Center for Clean Air Policy, *Aircraft NO_X Emissions: Analysis of New Certification Standard and Options for Introducing an Airport Bubble* (Feb. 2005), *available at* <http://www.ccap.org/pdf/Aircraft%20NOx%20Analysis%20Report_x007E_FINAL.pdf>.

[40] Notably California, Massachusetts and Texas. *See* GAO, *Aviation and the Environment*, Report: GAO-03-252 (Feb. 2003), *available at* <http://www.gao.gov/new.items/d03252.pdf> (explaining these state initiatives).

[41] CAA § 233, *supra* note 30. Adopted in 1993, these standards were revised in 1997 for the emissions of NO_x and CO from newly manufactured and certified commercial aircraft engines, to align with international standards. U.S. EPA, *Control of Air Pollution from Aircraft and Aircraft Engines: Emission Standards and Test Procedures*, Final Rule, 40 C.F.R. Part. 87 (1997), *available at* <http://www.epa.gov/fedrgstr/EPA-AIR/1997/May/Day-08/a11675.htm> (identifying/summarizing, *inter alia*, harmful effects of NO_x and CO_2).

[42] For example, "it is indisputable that Congress specifically declined to attempt a preemption of the field in the area of water pollution legislation, and as much as invited the States to enact requirements more stringent than the federal standards. *Mianus River Pres. Comm. v. EPA*, 541 F.2d 899, 906 (2d Cir. 1976). *Cf.*, "No State or political subdivision thereof may adopt or attempt to enforce any standard respecting emissions of any air pollutant from any aircraft or engine thereof unless such standard is identical to a standard applicable to such aircraft under this part." § 7573. [Emission Standards for Moving Sources] *State standards and controls* (Jan. 24, 2003), *available at* <http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=browse_usc&docid=Cite:+42USC7573>.

Nonetheless, lack of jurisdiction has been cited as a reason for state governments to participate in federally sponsored stakeholder meetings. *See infra* notes 52-57 (concerning stakeholder issues). *See* Center for Clean Air Policy, State Policy Website, *at* <http://www.ccap.org/publications_sp.htm> (providing diverse state environmental policy papers).

[43] 1990 Amendments, *available at* <http://www.epa.gov>; *see* EPA, *General Conformity Regulations*, *at* <http://www.epa.gov/ttncaaa1/genconformity.html>.

[44] *See, e.g.*, Commentary to AMCC V.b (describing the Florida Department of Environmental Protection's enforcement actions promoting environmentally responsible fueling practices under the Fla. Resource Recovery and Mgt. Act, § 403; FLA. ANN. LAWS ch. 403.727), *available at* <http://www.flsenate.gov/Statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=Ch0403/Sec727.HTM>).

[45] Nonetheless, state environmental laws with significant extraterritorial impact can face vexing limitations. Limits to the effective enforcement of state environmental laws include legal, economic and political hurdles," and interjurisdictional disputes. For example, a Wyoming energy official "warned that

California's [environmental] standard may be in 'legal peril' because it appears to violate the interstate-commerce clause of the U.S. Constitution." John J. Fialka, *States Divide over Greenhouse Gases*, WALL ST. J., Dec. 13, 2005, at p. A4, *available at* <http://pqasb.pqarchiver.com/wsj/access/940576121.html?dids=940576121:940576121&FMT=ABS&FMTS=ABS:FT&date=Dec+13%2C+2005&author=John+J.+Fialka&type=91_1996&desc=States+Divide+Over+Greenhouse+Gases>.

[46] ICAO is a specialized agency of the United Nations that seeks to "ensure the safe and orderly development of international civil aviation." ICAO arose out of the Chicago Convention on International Civil Aviation (Dec. 7, 1944), *available at* <http://www.mcgill.ca/files/iasl/chicago1944a.pdf>. *See* 15 U.N.T.A. 295, ICAO Doc. 7300/6th ed. (1980). The Chicago Convention's preamble includes a commitment to "public safety," [Chicago Convention, Art. 37(b)] and is "conscious of the adverse environmental impacts that may be related to aircraft activity . . . and on the quality of the human environment." ICAO Resolution A22.12, 22nd Sess. (Sep./Oct. 1977), *available at* <http://www.icao.or>. "Pollution knows no political boundaries, and in the U.S., we recognize that our environmental responsibility does not stop at our borders." Press Release, *quoting* William L. Wehrum, acting assistant admin. for air and radiation, EPA (May 18, 2006), *available at* <http://www.epa.gov>.

[47] CAEP was established by ICAO in 1983, superseding the Committee on Aircraft Noise (CAN) and the Committee on Aircraft Engine Emissions (CAEE). *See* ICAO, A35-7: *Consolidated Statement of Continuing ICAO Policies and Practices Related to Environmental Protection*, in Assembly resolutions in force, 8 Oct. 2004, Appendix H: Environmental impact of civil aviation on the atmosphere, *available at* <http://www.icao.int/icao/en/env/a33-7.htm#h>. *See, e.g.*, Jane Hupe, Sec'y of CAEP, *Presentation at the 22nd Sessions of the Subsidiary Bodies*, UNFCCC, *Webcast, available at* <http://unfccc.meta-fusion.com/sb22/templ/ply_sbi.php?id_kongresssession=193&player_mode=isdn_real> (outlining many of ICAO's environmental initiatives).

[48] The United Nations Framework Convention on Climate Change, 1997 (UNFCCC), *available at* <http://unfccc.int/not_assigned/b/items/1417.php>. UNFCCC's "ultimate objective," in part, is "to achieve . . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner." *Id. at* Art. 2, *available at* <http://unfccc.int/essential_background/convention/background/items/1353.php>.

[49] For example, the Intergovernmental Panel on Climate Change (IPCC – formed in 1998), *available at* <http://www.ipcc.ch/>, and the World Meteorological Organization (WMO), *available at* <http://www.wmo.ch/>, are important contributors to international environmental standards and regulations. The [IPCC's] [WMO's] scientific report on greenhouse gasses in 1990 served as the catalyst for The UN Framework Convention (1992) which has focused (since 1997) on implementing the Kyoto Protocol (the first formal binding legislation under the Convention), *available at* <http://unfccc.int/resource/docs/convkp/conveng.pdf>.

[50] *Kyoto Protocol to the UNFCCC, available at* <http://unfccc.int/resource/docs/convkp/kpeng.html>. "The entry into force of the Kyoto Protocol to the [UNFCCC] on 16 February 2005 gave new impetus to ICAO's work in addressing greenhouse gas emissions and reinforced ICAO's leadership role on aviation and climate change. Specifically, the Protocol calls on industrialized countries of the world to work through ICAO to pursue the limitation of greenhouse gas emissions from international civil aviation," Dr. Kotaite, *quoted in* ICAO, News Release, *International Civil Aviation Day Calls for the Greening of Aviation* (Nov. 30, 2005), *available at* <http://www.icao.int/cgi/goto_m.pl?/icao/en/search_icao.html>.

The Kyoto Protocol also requires 38 of the world's industrialized nations, including Canada, Japan, Russia and the European Union, to reduce greenhouse gas emissions five percent below 1990 levels by 2012. It targets six greenhouse gases—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6)—as well as ground level ozone, particulate matter, acid rain, and regional haze. CO_2 is the most important greenhouse gas,

representing about 75 percent of enhanced greenhouse effect, followed by N_2O. Greenhouse gases absorb thermal radiation from the earth's surface and have a blanketing effect on it. *See generally* ICAO, *Special Report on Aviation and the Global Atmosphere* (Apr. 1999), *available at* <http://icao.org/cgi/goto_m.pl?/icao/en/search_icao.html>. Aviation greenhouse gases are expected to increase 60 percent by 2025 and become a greater portion of the total transportation sources in the future. FAA, *Aviation & Emissions – A Primer* (Jan. 2005), pp. 10, 12, *available at* <http://www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/AEPRIMER.pdf>.

[51] As British Prime Minister Tony Blair astutely explained, "The blunt truth about the politics of climate change is that no country will want to sacrifice its economy in order to meet this challenge." *Quoted in* Editorial, *Kyoto's Dead Hand*, WALL ST. J., Dec. 10, 2005, p. A10. And, "a continuation of 'business as usual' would result in so much warming as to 'constitute a different planet'." James Hansen, Dir., NASA's Goddard Institute for Space Studies, *quoted in* Andrew C. Revkin, *Climate Debate: Incremental Gains*, N.Y. TIMES, Dec. 11, 2005, p. 14. Consider that U.S. emissions of the six major greenhouse gases in 2004 were two percent greater than in 2003. DOE, *Emissions of Greenhouse Gases in the United States 2004*, Report No. DOE/EIA-0573(2004), *available at* <ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057304.pdf>, and that a recent study found that the United States ranks 28th in meeting defined critical environmental goals. Yale Center for Environmental Law and Policy, et al., *2005 Environmental Sustainability Index, Benchmarking National Environmental Stewardship*, *available at* <http://www.yale.edu/esi/>.

[52] *See, e.g., Consolidated statement of continuing ICAO policies and practices related to environmental protection*, ICAO, Resolution A33, *available at* <http://www.icao.int/icao/en/env/a33-7.htm> (facilitating voluntary actions by developing, *inter alia*, voluntary guidelines, template agreements, and reporting procedures).

[53] GAO, *Aviation and the Environment, Strategic Framework Needed to Address Challenges Posed by Aircraft Emissions*, Report GAO-03-252 (Feb. 2003), at p. 4, *available at* <http://www.gao.gov/new.items/d03252.pdf> (emphasis added).

[54] In 1998, the U.S. EPA initiated a voluntary, stake-holder based forum—the *EPA/FAA Voluntary Aircraft Emissions Reduction Initiative*—to develop voluntary measures to reduce aviation-related emissions, including N_2O and HAPs. *Agreement Between Federal Aviation Administration and Environmental Protection Agency Regarding Environmental Matters Relation to Aviation* (Mar. 24, 1998) by FAA's Acting Assistant Adm'r for Policy, Planning, and Int'l Aviation, Louise Maillet, and EPA's Acting Assistant Adm'r for Air and Radiation, Richard Wilson, *available in* EPA Docket OAR-2002-0030, *available at* <http://www.epa.gov>.

[55] Telephone Interview with Jake Plante, National Resource Expert – Noise and Air Quality, Community and Environmental Needs Division, FAA (Oct. 27, 2005). The government is considering the next steps following the stakeholder initiative. *Id*. *See generally* EPA, Stakeholder Information Website, *at* <http://www.epa.gov/airprogm/oar/genconform/stake.htm>.

[56] EPA, *Emission Standards and Test Procedures, Summary and Analysis of Comments*, Report EPA420-R-05-004 (Nov. 2005), p. 42, *available at* <http://www.epa.gov/otaq/regs/nonroad/aviation/420r05004.pdf>.

[57] Authorized by The Vision 100-Century of Aviation Reauthorization Act, Pub. L. No. 108-176, (2003). *See* <http://www.faa.gov/airports_airtraffic/airports/environmental/vale/>, and EPA, *Guidance On Airport Emission Reduction Credits For Early Measures Through Voluntary Airport Low Emission Programs* (2004), *available at* <http://www.faa.gov/airports_airtraffic/airports/resources/publications/reports/environmental/media/AERC_093004.pdf>.

[58] Email from Josh Smith, General Manager, West Valley Flying Club (Oct. 13, 2005).

[59] Email from Rusty Sachs, Exec. Dir., Nat'l Ass'n of Flight Instructors (Nov. 14, 2005). Additionally, "CFIs should also hammer home the *consequences* of insensitivity to these issues. One lone pilot (with a

student pilot passenger) tarred all of GA and single-handedly ended all judicial consideration of freeing up the FRZ around the Washington, DC area by his uneducated, thoughtless and arguably crass behavior. One single pilot could conceivably inflict similar harm on all of GA by uneducated environmental behavior. And while that's the REAL consequence, the piece of it that will be most readily absorbed is this question: *How would you like to be known in the aviation world the same way that Hayden 'Jim' Schaeffer is known?*" Email from Michael Radomsky, Pres., Cirrus Owners and Pilots Ass'n (June 14, 2006).

[60] *See, e.g.*, FAA, *Private Pilot Practical Test Standards for Airplane*, IV.A(11), FAA-S-8081-14A (Aug. 2002), *available at* <http://faa.gov/education_research/testing/airmen/test_standards/pilot/media/FAA-S-8081-14A.pdf> (addressing compliance with noise abatement procedures only).

[61] As Michael W. Brown, Manager, General Aviation and Commercial Division, FAA has recognized, "An unfortunate paradigm shift seems to have taken place within many segments of the flight training community. Instead of being used as an instrument for measuring pilot competence, the PTS has become a guide around which many training curricula are developed and taught. Without question, this has profoundly impacted the quality of flight training, at all levels, throughout the general aviation (GA) community." *Transforming Science into Art - What the PTS can and cannot do for pilot training*, FAA AVIATION NEWS (July-Aug. 2005), at p. 26, *available at* <http://www.faa.gov/news/aviation_news/2005/media/JulyAugust2005Issue.pdf>.

[62] This training should include "why" certain practices are harmful, explain the implications of poor environmental stewardship, and how pilots can act responsibly. One aviation environmental expert explained that enforcement alone is limited, "but I found that if we show pilots a better way, they buy into it." Telephone Interview with Ric Perri, VP, Aviation Electronics Ass'n (Jan. 20, 2006). Also, the commentary's advocacy of enhanced environmental training for pilots is not intended to displace or otherwise dilute conventional pilot training.

[63] The notion and benefit of including some *measurable guidance* for GA pilots was underscored by one well-respected GA columnist and environmentalist: "Without hard and fast guidelines the psychological result is a 'why bother?' feeling and 'to hell with them' and the pilot quits trying because he or she feels that no matter what is done, the pilot will be the target of flak without having a defense." Email from Rick Durden, Exec. Dir., LightHawk (June 6, 2006).

[64] *See* Michael Baum, *Proposal To Designate Locations Of Collection Sites For Contaminated Fuel, Oil, Universal Waste, And Hazmat On Airport Diagrams* (Feb. 27, 2006), *available at* <http://www.secureav.com/ACF.pdf> (proposing to designate used oil, contaminated fuel and HazMat collection sites on Airport Diagrams—to facilitate enhanced collection of these materials, emphasize the importance of environmental responsibility, and highlight airports with robust collection programs, thereby encouraging similar actions by other airports).

[65] And seek to include such terms in all relevant airport-related agreements.

[66] *See* NTSB, *Brief of Accident*, No. DCA96MA054 (Adopted Mar. 31, 1998), *available at* <http://ntsb.gov/ntsb/GenPDF.asp?id=DCA96MA054&rpt=fi> (re: flight from Miami to Atlanta on May 11, 1996). The ValueJet crash is an extreme example, but nonetheless instructive.

[67] Hazardous Materials Regulations (HMR), 49 C.F.R. §§ 171-178 and 175.20 (related to air). *See generally* DoT, *Hazardous Materials Regulations Overview, at* <http://hazmat.dot.gov/training/regs.htm>. Also, consider civil penalties and criminal jurisdiction of the FAA under its Compliance and Enforcement Program for certain hazardous materials violation, *available at* <http://www.faa.gov/newsroom/factsheets/2003/factsheets_0309.htm>. *See generally* The Office of Hazardous Materials Safety, U.S. DOT, *at* <http://hazmat.dot.gov> (coordinating a national safety program for the transportation of hazardous materials by air, rail, highway and water).

[68] For example, NTSB, *Hazardous Materials Incident Brief*, Accident No: DCA-99-MZ-001 (Oct. 8, 1998), *available at* < http://www.ntsb.gov/publictn/2000/HZB0001.htm> (spill of undeclared shipment of hydrogen peroxide in cargo compartment of aircraft); DoT, *HazMat Summary by Mode of Transportation / Cause for 2005* (May 1, 2006), *available at*

<http://hazmat.dot.gov/pubs/inc/data/2005/2005cause_mode.pdf> (indicating relatively considerable HazMat incidents caused by improper or inadequate preparation for transportation, among other causes). *See* Steve Creedy, *Alert for Dangerous Goods on Aircraft*, 2006 WLNR 463,383 (Jan. 10, 2006) (thirty percent of the four hundred DG incidents in Australia in 2005 posed a potentially serious threat).

[69] FAR §135.333, *Training requirements: Handling and carriage of hazardous materials*, *available at* <http://www.faa.gov>, *also available at* <http://risingup.com/fars/info/part135-333-FAR.shtml>. These rules are organized by type of potential hazard. Each class of materials has significantly different characteristics that deserve independent consideration. Nine classes are defined: explosives, gases (compressed, liquefied, or under pressure), flammable liquids, flammable solids, oxidizers, toxic and infectious substances, radioactive materials, corrosives, and miscellaneous. DoT, *at* <http://www.dot.gov/>, *also available at* <http://en.wikipedia.org/wiki/Haz-mat>.

[70] Additionally, when DG/HazMat are being carried "in furtherance of a commercial purpose," such as in a private aircraft, the DoT Hazardous Materials Regulations (HMR - 49 C.F.R. Part 100-180) apply. Letter from Hattie L. Mitchell, Chief, Regulatory Review and Reinvention, Office of Hazardous Materials Standards, Pipeline and Hazardous Materials Safety Admin., DoT to Michael J. Pangia, P.C., Ref. No. 05-0201 (Jan. 6, 2006) (copy on file with author).

[71] DoT, Office of Hazardous Materials Safety, *Incident Reporting* 49 C.F.R. § 171.15, *available at* <http://www.myregs.com/dotrspa>. The HazMat rules are organized by type of potential hazard. Each class has materially different characteristics that deserve independent consideration.

Class 1:	Explosives
Class 2:	Gases (compressed, liquefied or dissolved under pressure)
Class 3:	Flammable liquid
Class 4:	Flammable solid
Class 5:	Oxidizers
Class 6:	Toxic and Infectious substances
Class 7:	Radioactive material
Class 8:	Corrosives
Class 9:	Miscellaneous

[72] Brien A. Seeley, *Fuel Handling Safety*, *available at* <http://cafefoundation.org/v1/aprs/Fuel%20Handling%20Safety.pdf>.

[73] "Dry ice has a temperature of -109.3º F (-78.5º C) and can be used to keep perishable foods cold. As dry ice melts, it undergoes sublimation (i.e., direct conversion from a solid into gaseous CO_2, bypassing the liquid state). Improper ventilation during use, transport, or storage of dry ice can lead to inhalation of large concentrations of CO_2 with subsequent harmful effects, including death. Previous reports have described illness and death caused by occupational exposures and unintentional nonoccupational exposures to dry ice in enclosed spaces such as automobiles and submarines.

Under normal conditions at ambient temperature, CO_2 is a colorless, odorless gas and a simple asphyxiant that displaces oxygen when inhaled. As the inhaled concentration of CO_2 increases, more oxygen is displaced from the lung alveoli, where gas exchange takes place. The central nervous system (CNS) tightly regulates dissolved CO_2 in the blood; changes in the artial pressure of CO_2 cause changes in the respiratory rate. An increase in CO_2 concentrations triggers an increase in respiratory rate, causing further uptake of CO_2, which can ultimately lead to signs and symptoms of hypoxia and hypoxemia, including headache, confusion, disorientation, and death. Respiratory and CNS changes can occur within seconds of exposure to high levels of CO_2, suggesting that the toxicity of CO_2 might be related to systemic effects that are not fully understood." M. Tucker, et al., *Acute Illness from Dry Ice Exposure During Hurricane Ivan — Alabama, 2004*, MORBIDITY AND MORTALITY WEEKLY REPORT, Centers for Disease Control and Prevention (Dec. 24, 2004) (citations omitted), *available at* <http://www.cdc.gov/mmwr/PDF/wk/mm5350.pdf>.

See generally FAA, AC 91-76, *Hazard Associated with Sublimation of Solid Carbon Dioxide (Dry Ice) Aboard Aircraft* (Sept. 20, 2004), *available at* <http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/0A16A5A31A11D81F86256F9400528023?OpenDocument>. In commercial operations, including under Parts 19, 135 and 121, the transport of dry ice by passengers to refrigerate perishables is limited to 4.2 lbs. (carry-on), and to 5 lbs. (for checked luggage) – provided it is properly vented. 49 C.F.R. § 175.10(iii)(10), *available at* <http://hazmat.dot.gov/regs/rules/final/71fr/71fr-14585.htm>.

[74] Additionally, poorly protected battery terminals and accidental activation of battery-powered equipment have caused smoke and fires. *See* Commentary to AMCC V.b (explaining the intensive use of batteries in GA). The following pilot narrative provides a good example of battery issues.

> JUST WANTED TO REINFORCE THE PROB[LEM] WITH CARRYING BATTERIES WITH UNPROTECTED TERMINALS AS DESCRIBED BY THE C172 [PILOT] IN THE OCT/99 CALLBACK. I WAS [CLIMBING] OUT ON [TAKE OFF] YRS AGO IN A C182 WHEN I HEARD A SHARP EXPLOSION. TURNED AROUND AND SAW A CLOUD OF LIGHT SMOKE IN THE BAGGAGE COMPARTMENT. I THOUGHT THE ACFT BATTERY HAD EXPLODED BUT ALTERNATOR OUTPUT, ETC WERE NORMAL. IMMEDIATELY RETURNED TO ARPT, LANDED, AND REMOVED EVERYTHING FROM BATTERY COMPARTMENT. AFTER CHKING ACFT BATTERY, BEGAN TO EMPTY LUGGAGE, ETC. FINALLY FOUND THE REMAINS OF THE CULPRIT IN MY FLT CASE. I WAS USING A PORTABLE INTERCOM AT THE TIME AND HAD CHANGED BATTERIES (9 VOLT ALKALINE) JUST BEFORE ENG START AND HAD THROWN THE 'DISCHARGED' BATTERY INTO MY FLT CASE FOR DISPOSAL AT HOME. IT HAD SHORTED OUT ON [A] METALLIC PIECE OF THE FLT CASE AND HAD EXPLODED, APPARENTLY DUE TO THE IGNITION OF A GASEOUS BY-PRODUCT OF THE SHORTED CONDITION WHICH ACCUMULATED IN THE FLT CASE. AFTER EMPTYING THE FLT CASE, THE ONLY MAJOR PARTS OF THE BATTERY WE FOUND WERE THE END PLATES AND THE METALLIC CASE, WHICH WAS SPLIT OPEN. IF THIS EXPLOSION HAD OCCURRED IN A POCKET, IT COULD HAVE CAUSED SERIOUS INJURY. MY WIFE IS A REGISTERED NURSE, AND WAS IN THE HABIT OF CARRYING SPARE BATTERIES FOR PACEMAKERS, ETC AROUND THE HOSPITAL IN A POCKET WITH COINS, KEYS, ETC. NEEDLESS TO SAY, SHE IMMEDIATELY STOPPED THAT HABIT. WHEN WE CARRY 9 VOLT ALKALINES NOW, THEY NOT ONLY HAVE A TERMINAL PROTECTOR IN PLACE, THEY ARE ALSO HELD ON WITH RUBBER BANDS. HOPE THIS WORD OF CAUTION HELPS KEEP THE SKIES (AND OUR BODIES) SAFER.

NASA, Aviation Safety Reporting System (ASRS) Report: 452549 (Sept. 19, 1999), *available at* <http://www.asrs.gov>.

[75] *See, e.g.*, Australian Gov't, Civil Aviation Safety Authority, *Is your Luggage Safe? A Guide for Aircraft Passengers*, *at* <http://www.casa.gov.au/dg/luggage/index.htm>.

[76] *See, e.g., A Sample Passenger Briefing*, *available at* <http://www.secureav.com/briefing.doc>, and a *Seaplane Passenger Briefing-Notes for the Pilot*, *available at* <http://www.secureav.com/seaplane-briefing.pdf> (addressing passenger DG/HazMat issues).

[77] *See, e.g.*, AMCC IV, *Security*, Sample Recommended Practice, *available at* <http://www.secureav.com>.

[78] Code Examples are examples from relevant codes of conduct that are presented for background, perspective, and comparison. Code Examples are not necessarily endorsed by the AMCC Commentary.

[79] *Available at* <ftp://www.fai.org/documents/pc/codecond.rtf>.

[80] (Oct. 1998), *available at* <http://www.iaopa.org/info/finalpol.doc>.

[81] *Available at* <http://www.copanational.org/non-members/GreenPolicy%203.htm>.

[82] *Available at* <http://www.fai.org/environment/code_conduct>.

[83] (Mar. 1, 2003) (emphasis added).

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