October 22, 2023

Office of Pesticide Programs
Environmental Protection Agency Docket Center (EPA/DC), (28221T)
1200 Pennsylvania Ave. NW
Washington, DC 20460-0001

RE: Draft Herbicide Strategy Framework to Reduce Exposure of Federally Listed Endangered and Threatened Species and Designated Critical Habitats from the Use of Conventional Agricultural Herbicides; Docket ID: EPA-HQ-OPP-2023-0365

The National Agricultural Aviation Association (NAAA) appreciates the opportunity to comment on EPA's Draft Herbicide Strategy Framework to Reduce Exposure of Federally Listed Endangered and Threatened Species and Designated Critical Habitats from the Use of Conventional Agricultural Herbicides as well as the supporting technical document and case study summary.

U.S. Aerial Application Industry Background: NAAA represents the interests of the 1,560 aerial application industry owner/operators and 2,028 non-operator agricultural pilots throughout the United States licensed as commercial applicators that use aircraft to enhance the production of food, fiber and bio-energy; protect forestry; protect waterways and ranchland from invasive species; and provide services to agencies and homeowner groups for the control of mosquitoes and other health-threatening pests. NAAA represents both crewed and uncrewed aircraft, however, the following comments dealing with the movement of applied products by air refers to manned aerial applications. Unmanned aircraft (UA) have not yet been sufficiently evaluated for efficacy and drift potential they may pose to the environment and people, including both bystanders and pesticide handlers. Field research comparable to the Spray Drift Task Force has not been conducted on UA, nor have UA been added to the AgDRIFT model EPA uses to assess the risk of drift from terrestrial, airblast and manned aerial applications. A detailed explanation of NAAA's position can be found in our letter sent to the EPA on the issue in January of 2020[1].

Within agriculture and other pest control situations, manned aerial application is an important method for applying pesticides, for it permits large areas to be covered rapidly—by far the fastest application method of crop inputs—when it matters most. It takes advantage, more than any other form of application, of the often too-brief periods of acceptable weather for spraying and allows timely treatment of pests while they are in critical developmental stages, often over terrain that is too wet or otherwise inaccessible for terrestrial applications. It also treats above the crop canopy, thereby not disrupting the crop and damaging it. Aerial application has greater productivity,

[1] NAAA letter to EPA, January 16, 2020.
https://www.agaviation.org//Files/Comments/UAS%20Letter%20to%20EPA%20re%20testing%20drones%20for%20efficacy%20and%20env%20safety%2020200117.pdf

accuracy, speed, and lack of damage to the crop compared to ground application[2]. Although the average aerial application company is comprised of but six employees and two aircraft, as an industry these small businesses treat nearly 127 million acres of U.S. cropland each season, which is about 28% of all cropland used for crop production in the U.S. In addition to the cropland acres, aerial applicators annually apply to 5.1 million acres of forest land, 7.9 million acres of pasture and rangeland, and 4.8 million acres for mosquito control and other public health concerns.

While there are alternatives to making aerial applications of pesticides, aerial application has several advantages. In addition to the speed and timeliness advantage aerial application has over other forms of application, there is also a yield difference. Driving a ground sprayer through a standing crop results in a significant yield loss. Research from Purdue University[3] found that yield loss from ground sprayer wheel tracks varied from 1.3% to 4.9% depending on boom width. While this study was conducted in soybeans, similar results could be expected in other crops as well. Data from a Texas A&M University economics study[4] and the 2019 NAAA industry survey[5] were used to calculate that the aerial application industry is directly responsible for the production of 1.69 billion bushels of corn, 199 million bushels of wheat, 548 million pounds of cotton, 295 million bushels of soybean, and 3.33 billion pounds of rice annually that would be lost every year without the aerial application of pesticides. The value in additional crop yield that the aerial application industry brings to farmers, input suppliers, processors, and agricultural transportation and storage industries for corn, wheat, cotton, soybean, and rice production in the U.S. is estimated to be about $37 billion[6].

Research summarized by the University of Minnesota[7] describes how soil compaction from ground rigs can negatively affect crop yields due to nitrogen loss, reduced potassium availability, inhibition of root respiration due to reduced soil aeration, decreased water infiltration and storage, and decreased root growth. Aerial application offers the only means of applying a crop protection product when the ground is wet and when time is crucial during a pest outbreak. A study on the application efficacy of fungicides on corn applied by ground, aerial, and chemigation applications[8] further demonstrates that aerial application exceeds ground and chemigation application methods in terms of yield response. The aerial application of crop protection products results in greater harvest yields of crops. This in turn results in less land being used for agricultural production, preserving more wetlands for natural water filtration, forest ecosystems for carbon sequestration and habitat for threatened and endangered species.

The Texas A&M[4] study revealed that the total area of cropland needed to replace the yield lost if aerial application was not available for corn, wheat, soybean, cotton, and rice production is 27.4 million acres, an area roughly the size of Tennessee. Aerial applicators seed 3.8 million acres of

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[2] Kováčik, L., and A. Novák, 2020. "Comparison of Aerial Application vs. Ground Application." *Transportation Research Procedia* 44 (2020) 264–270.
[3] Hanna, S., S. Conley, J. Santini, and G. Shaner. 2007. "Managing Fungicide Applications in Soybean." Purdue University Extension Soybean Production Systems SPS-103-W. https://www.extension.purdue.edu/extmedia/sps/sps-103-w.pdf
[4] Dharmasena, S. 2020. "How Much is the Aerial Application Industry Worth in the United States?" Research presented at the 2020 Ag Aviation Expo, Savannah, GA. https://www.agaviation.org/2020aatresearchpapers
[5] National Agricultural Aviation Association. May 2019. "2019 NAAA Aerial Application Industry Survey: Operators." https://www.agaviation.org//Files/Comments/NAAA%202019%20Operator%20Survey.pdf
[6] Dharmasena, S. 2021. "Value of the Agricultural Aerial Application Industry in the United States" Research presented at the 2021 Ag Aviation Expo, Savannah, GA. https://www.agaviation.org/2021aatresearchpapers
[7] University of Minnesota. "Soil Compaction." Accessed April 29, 2021. https://extension.umn.edu/soil-management-and-health/soil-compaction
[8] Thomas, D. 2009. Unpublished research results submitted to EPA. https://www.agaviation.org//Files/Comments/Fungicide%20efficacy%20results.pdf

cover crops annually[5]. This means that aerial applicators are responsible for helping to sequester 1.9 million metric tons of CO2 equivalent annually, which according to the EPA would be the equivalent of removing approximately 412,000 cars with carbon-combustion engines from the roads each year.

The aerial application industry is also actively involved in education and research efforts to improve the accuracy and safety of aerial applications. The National Agricultural Aviation Research and Education Foundation (NAAREF) is a non-profit organization dedicated to promoting research, technology transfer and advanced education among aerial applicators, allied industries, government agencies and academic institutions. NAAREF's Professional Aerial Applicators' Support System (PAASS) program is a four-hour course offered annually at all state and regional agricultural aviation association conventions. The curriculum is brand new every year and a minimum of one hour of PAASS is focused on environmental professionalism. This ensures aerial applicators are kept up to date on the latest information related to making accurate applications and drift mitigation. Nozzle selection, buffer zones, inversions, precision application technology, dissection of real-life drift incidents, and proper spray boom setup are some of the environmental professionalism topics that have been covered in PAASS.

Five years after PAASS became part of the aerial application annual curriculum in 1999, there was a 26% drop in drift incidents according to Association of American Pest Control Officials drift surveys. In addition, ag aircraft accidents have also significantly declined. From 1999 to 2010, the accident rate per 100,000 hours flown dropped by 21.6% compared to pre-PAASS accident rates. From 2011 to 2019, the accident rate dropped even more—30.8%—compared to pre-PAASS accident rates. Each year we continue to see a drop in our accident rate since pre-PAASS days, but now it declines more incrementally. While aviation safety is the domain of the FAA and not the EPA, the reduction in accidents proves PAASS has had, and continues to have, a significant positive impact on the aerial application industry.

Another NAAREF program is Operation S.A.F.E. (Self-regulating Application & Flight Efficiency). The primary component of Operation S.A.F.E. is a fly-in clinic. At a S.A.F.E. fly-in, aerial applicators can have their aircraft calibrated and application patterns (both liquid and dry) measured and evaluated for accuracy and uniformity. Spray droplet size is also measured at a fly-in to ensure the agricultural aircraft is creating the droplet size required by the labels for products to be applied by the aircraft. Many of the concepts used mitigate the risk of drift from agricultural aircraft have originated from ideas first tested at Operation S.A.F.E. fly-ins.

Just this year, NAAA created a professional certification program for the aerial application industry named C-PAASS for Certified Professional Aerial Application Safety Steward. To be certified under C-PAASS aerial applicators must take the PAASS program annually and Operation S.A.F.E. biennially, in addition to belonging as a member to their state/regional agricultural aviation association and the NAAA. Next year, C-PAASS professionals will be required to take and be tested on additional aviation safety and environmental stewardship curriculum offered on-line through learning management system software NAAA installed. The purpose of C-PAASS is to enhance professionalism in the aerial application industry as our statistics show that those that participate in our educational programs are safer from both an aviation and environmental perspective.

Comments

NAAA appreciates EPA's attempt to increase the efficiency of the registration and registration review process by improving how ESA compliance is handled as put forth in the draft Herbicide Strategy (HS). First and foremost, NAAA fully supports the concept of using wind-directional buffers zones as the primary solution to mitigate the risks to listed species and critical habitat from the aerial applications of herbicides. Furthermore, NAAA strongly feels all buffers proposed on all labels, whether they be for FIFRA or ESA obligations, be wind directional. Science has consistently indicated that drift only moves downwind[9,10,11]. NAAA has routinely recommended all buffer zones for aerial applications of all pesticides be wind directional in numerous comments submitted to the EPA throughout the years.

NAAA applauds the EPA for proposing a solution that protects threatened and endangered species as well allows growers to utilize pesticides to control pests on their entire field. Wind-direction-based buffers zones will minimize impact to growers because these areas can still be treated by aerial applicators when the wind is blowing away from the endangered species and their critical habitat. The buffers will also fully protect sensitive areas from spray drift because they will be implemented when the wind direction is towards the sensitive site. They provide a win-win solution that balances the needs for optimum agricultural production and protection of listed species and critical habitats. Furthermore, allowing for the area near field borders to be treated once the wind shifts away from a sensitive area will enable greater crop yields resulting in less land needed for agricultural production and leaving more land available for endangered and threatened species habitat.

Aerial applicators have the tools necessary to provide immediate and onsite wind direction measurement, so if wind direction does change during the application, they can respond immediately. Aerial applicators can monitor weather conditions in the cockpit and thus evaluate the need for a buffer zone in real time using a smoker or AIMMS. A smoker injects a small amount of vegetable oil into the aircraft exhaust system that creates smoke, allowing the pilot to determine, by observing smoke movement, the wind direction, and an estimate of wind speed. Inversions can also easily be detected by observing vertical smoke movement. The Aircraft Integrated Meteorological Measurement System (AIMMS) provides real-time onboard weather data, including wind speed and direction, temperature, and humidity. This enables the pilot to take into account outside wind speed and direction when making every pass.

Both smokers and AIMMS can also provide critical information on air stability and the presence of an inversion. The AIMMS probe can directly measure temperature. As an aerial applicator descends into the target field, they can determine if the temperature increases or decreases as they get closer to the ground. If the temperature cools as they descend, they know there's an inversion present. A smoker offers a visual indicator of an inversion. If the smoke rises as it spreads out, that is a sign of a normal temperature profile with the warmest air at the surface pushing the smoke upward. If the smoke hangs at the same altitude it was released, that's a sign that an inversion is present and vertical mixing of the air is minimal. Avoiding applications during an inversion is a critical drift mitigation.

NAAA strongly encourages EPA to move towards the use of Tier 3 in AgDRIFT before finalizing the HS. Many of the high magnitudes of difference (MoDs) and required buffer zone distances in the HS will be reduced when the drift from aerial applications is more accurately estimated by

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[9] Kirk, I.W., M.E. Teske, H.W. Thistle. 2002. "What About Upwind Buffer Zones for Aerial Applications?" *Journal of Agricultural Safety and Health* 8(3): 333-336.

[10] Teske, M.E., S.L. Bird, D.M. Esterly, S.L. Ray, S.G. Perry. 2003. "A User's Guide for AgDRIFT ® 2.0.07: A Tiered Approach for the Assessment of Spray Drift of Pesticides." https://usermanual.wiki/Pdf/AgDriftusermanualpubFes2003.1946090729.pdf

[11] Butts, T.R., B.K. Fritz, K.B. Kouame, J.K. Norsworthy, L.T. Barber, W.J. Ross, G.M. Lorenz, B.C. Thrash, N.R. Bateman, J.J. Adamczyk. 2022. "Herbicide spray drift from ground and aerial applications: Implications for potential pollinator foraging sources." Scientific Reports (2022) 12:18017. https://doi.org/10.1038/s41598-022-22916-4

using the Tier 3 model as proposed in a letter sent from NAAA to the Office of Pesticide Programs in June of 2020[12]. A recent field study conducted at the University of Arkansas concluded the drift estimates from the Tier 1 model were "greatly over-predicting" the amount of drift physically measured in the field study[11]. EPA acknowledges in the HS case studies "that for aerial drift estimation, the difference between EECs [estimated environmental concentration] generated under default assumptions and applications under field application conditions could be on an order of magnitude scale." By more accurately modeling the drift from aerial applications, buffer distances could potentially be reduced while still adequately protecting endangered species and sensitive areas such as aquatic and conservation areas.

NAAA acknowledges and appreciates EPA comments in the draft technical paper accompanying the HS that they are considering NAAA's prior comments on utilizing Tier 3 in AgDRIFT. NAAA is encouraged that EPA may update input parameters and spray drift modeling prior to implementing spray drift buffers calculated using AgDRIFT as described in the HS. NAAA fully supports EPA conducting these updates.

As an example of the difference in modeled drift between Tier 1 and Tier 3 with NAAA's parameters, the fraction of material applied 200 feet downwind from the edge of the application area to a terrestrial area is 0.0456 with the Tier 1 AgDRIFT model. When the Tier 3 model with all the assumptions described in our letter to the EPA are used, the fraction of applied material downwind from application area to a terrestrial area is 0.0261, a reduction of 43 percent.

NAAA supports EPA's analysis of the impact using larger droplet sizes has on reducing drift from aerial applications, and the ability to reduce the buffer zone length by using larger droplet sizes as detailed in the HS case studies. However, simply using a larger droplet size in the Tier 1 AgDRIFT model does not eliminate the other inaccuracies associated with the Tier 1 model. For example, as previously mentioned the Tier 1 AgDRIFT model with the default fine to medium droplet size and using the terrestrial assessment, the fraction of applied materials estimated at 200 feet is 0.0456. If the droplet size is increased to medium to coarse, but still using all of the other erroneous assumptions from Tier 1 model, the fraction of applied materials at 200 feet is reduced to 0.0245.

If the Tier 3 model with all the assumptions described in our letter to the EPA (the exception being setting droplet size to medium to coarse for a direct comparison with the Tier 1 examples in the previous paragraph) is used, the fraction of applied materials is further reduced to 0.0186. This is a 59% reduction in possible drift compared to the Tier 1 model with fine to medium droplet size and a 24% reduction in possible drift compared to the Tier 1 model with the same medium to coarse droplet size. It is important to note when assessing the level of drift reduction achieved using the Tier 3 model, as was done for these examples, that wind speed in the Tier 3 model was set to 15 mph while the wind speed in the Tier 1 model was only at 10 mph.

These examples highlight why it's critical to use the Tier 3 AgDRIFT model with accurate parameter settings to estimate aerial drift depositions, not just increase the droplet size in the Tier 1 model. More accurate assessments of aerial drift depositions will result in reduced MoDs which will in turn reduce the proposed wind-directional buffer zone distances for many pesticides and use rates.

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[12] NAAA letter to EPA, June 29, 2020.
https://www.agaviation.org//Files/Comments/EPA%20letter%20re%20AgDRIFT%20Tier%203%20aerial%20risk%20assessment%20use%2020200629.pdf

Related to comparing the Tier 1 and Tier 3 AgDRIFT models is the difference in droplet size classification categories used between the two models, as well as what aerial applicators actually use when setting up their agricultural aircraft. The Tier 1 AgDRIFT model uses droplet size class ranges to describe the droplet size class, i.e. fine to medium, medium to coarse, etc. While these same ranges can be used in Tier 3, the Tier 3 model allows the use of specific droplet size classification categories, i.e., fine, medium, coarse, etc. The use of specific droplet size classes reflects how aerial applicators utilize the USDA-ARS Aerial Application Technology Research Unit's (AATRU) droplet size models[13]. When a pesticide label requires the aerial applicator use a coarse droplet size, they use AATRU's model to select and setup nozzles to create a coarse droplet size. Neither the AATRU model nor labels allow for the use of class ranges as seen in Tier 1.

This directly impacts how the buffer zone requirements laid out in the HS and case studies would be applied for an actual application. For instance, when an applicator sets up their aircraft to produce a coarse droplet size, would they be required to use the M-C buffer zone distance of the C-VC? When EPA switches to the use of the Tier 3 AgDRIFT model, they should also use discreet droplet size classes instead of ranges in order to ensure aerial applicators clearly understand how to comply with the wind-directional buffer zones in the HS.

Regarding the aerial drift mitigations detailed in the HS and cases studies, NAAA suggests EPA also consider using reduced boom lengths and droplet sizes larger than very coarse as mitigation options for aerial applications. NAAA detailed the effectiveness at reducing drift using such combinations in a letter sent to EPA in June of 2023[14]. These additional mitigations could be used to further reduce the MoDs and the length of required buffer zones. Furthermore, NAAA does not encourage or support the use of very fine or fine droplets on any application of any pesticide, including herbicides, anywhere unless there is specific data from the registrant that proves the smaller droplet size is necessary for efficacy. NAAA is actively promoting the use of coarse or larger droplet sizes in the PAASS Program, including example setups that can produce extremely coarse and even ultra-coarse on agricultural aircraft.

In response to EPA's comment that they have insufficient data to verify the effectiveness of reducing the boom length on drift reduction, NAAA would like to point out the reductions in drift resulting from boom length reductions detailed in our June of 2023 letter[14] come directly from AgDRIFT, the same model EPA is using as the basis for all of the EEC estimates in the HS. NAAA is currently coordinating with AATRU to conduct a field study that documents the impact that reducing the boom length on agricultural aircraft has on downwind drift. NAAA will provide this data to EPA when the research is completed.

In the draft technical paper supporting the HS, NAAA strongly supports the conclusion that the presence of a standing crop reduce drift. NAAA also supports the ability to reduce the buffer zone distance when a crop is present. NAAA once again suggests, as we did in our June 2020 letter to EPA[12], that all aerial application risk assessments be made using a surface roughness that reflects the presence of a standing crops in AgDRIFT. For those pesticides for which aerial applications are made to bare ground, the surface roughness can be adjusted back to bare ground to reflect that.

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[13] USDA-ARS Aerial Application Technology Aerial Atomization models. https://www.ars.usda.gov/plains-area/college-station-tx/southern-plains-agricultural-research-center/aerial-application-technology-research/docs/a-models/ Accessed October 20, 2023.
[14] NAAA letter to EPA, June 27, 2023. https://www.agaviation.org/wp-content/uploads/2023/08/202306-epa-letter-drift-mitigation.pdf

NAAA agrees that wind direction does not appreciably change during the short time period it takes to make an aerial application on a field. NAAA agrees with EPA's conclusion that spray drift buffers are not necessary in upwind directions. As previously stated in these comments, the required buffer zone distances for aerial applications would be lower if the more accurate Tier 3 AgDRIFT model was being used. NAAA is truly appreciative that EPA continues to investigate its usage for aerial application risk assessments. Finally, NAAA supports reducing buffer zone distance when making applications in lower wind speeds.

NAAA opposes the requirement for a windbreak in addition to a 300-foot downwind buffer zone as detailed in several of the spray drift mitigation measures tables in the case studies. While NAAA does not dispute that a windbreak indeed reduces drift, it is impractical to force growers to plant windbreaks along all fields bordering generalist habitats, and the length of time required could mean aerial application might not be utilized in some fields until the windbreak was of sufficient height to offer protection. However, NAAA believes the MoDs that required the use of the combination of 300-foot buffer zone and a windbreak will be reduced when EPA uses the Tier 3 model with appropriate assumptions as they finalize the HS.

Regarding how the mitigations described in the HS will be deployed geographically, NAAA is concerned with the tremendous size of the impacted area. While the Vulnerable Species Pilot Project (VSPP) was directed as accurately as possible towards the location of listed species, the HS indicates that the vast majority of cropland in the U.S. will fall under some type of required ESA mitigation.

The concept of protecting generalist species via required mitigations on the main pesticide label and the description of terrestrial and aquatic habitats on page 54 in the HS means that large swaths of land must now be treated as potential locations for listed species. The broad application of complicated mitigations, many of which will be costly and difficult for growers to implement, in order to protect listed species that may or may not be present in what EPA has defined as habitat does not seem feasible. NAAA strongly believes that EPA needs to continue to work with FWS to accurately define the exact locations of listed species and critical habitat as opposed to the approach taken in the HS.

NAAA is also concerned with the complexity of the HS and how all of the information will be transferred to commercial pesticide applicators. The HS has numerous classification levels such as 4 different PULAs, monocot versus dicot, and listed, obligate, and generalist species. It is not entirely clear how much of this information will need to be utilized by an applicator. It would be helpful to see a mocked-up label, PULAs, and bulletins on BLT in order to fully understand the level of information presented to an applicator and how they must process that information in order to comply with the HS and implement the necessary mitigations. Added to complexity and potential for confusion are the requirements for compliance with the interim ecological mitigations, laid out in EPA's ESA workplan update, and the VSPP. EPA will most certainly need to develop comprehensive education programs in order to transfer ESA compliance knowledge to growers and applicators.

NAAA urges EPA to ensure BLT is as streamlined, easy to use, and responsive as possible. In order to reduce the burden on the applicator and allow for quick usage, especially for unexpected work orders coming in with no advance notice and needing immediate applications, being able to check a large number of application sites in a short period of time will be critical. Many aerial applicators work in rural areas with more limited internet speeds, so BLT should also be refined so it can still function in areas with reduced internet capabilities. It is also important the PULAs are as accurately defined as possible.

For runoff and erosion minimization, NAAA remains concerned about who is responsible for ensuring compliance with the runoff and erosion reduction mitigations proposed in the HS. Many of options have nothing to with the actual application of a pesticide and instead are completely under the control of the grower. It is unrealistic and overly burdensome to make a commercial applicator responsible for ensuring a grower complies with four of these options. Commercial applicators, either aerial or ground, are frequently not the decision makers nor land managers for the fields to which they apply pesticides. Accordingly, commercial applicators should not be responsible for ensuring grower compliance with the list of options. EPA's own National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit (PGP) clearly demonstrates the difference between an applicator and a decision maker. NAAA agrees with comments submitted to EPA by the Illinois Fertilizer and Chemical Association (IFCA) about this issue in the HS.

The 2019 NAAA industry survey shows that 46% of aerial application business have three employees or fewer. Tasking the work of verifying grower compliance with the list of options would be extremely burdensome to such small aerial application businesses. It also sets the applicator up for a penalty or possible tort pursuit for not providing information for practices that are the responsibility of the property owner or decision-maker. While some of the items in table 4 could be discerned from a recent remotely sensed image or an orbital reconnaissance, many would require information only the grower could provide. If the grower incorrectly selects picklist options or fails to implement them correctly, will the commercial applicator be held responsible? Will a commercial applicator be held responsible if a grower changes their mind and selects an option from the picklist that is different from the one provided by the grower to an applicator and thus in the application records? For these reasons, commercial applicators should not be held accountable for activities that are entirely outside of their control or expertise.

Conclusion

NAAA recommends EPA use the Tier 3 AgDRIFT model to estimate the spray drift deposition EECs for aerial applications when it finalizes the herbicide strategy. We continue to support the use of wind-directional buffer zones as a mitigation tool to protect listed species and critical habitat, and recommend EPA further investigate how the use of larger droplet sizes and reduced boom length can further reduce drift from aerial applications. NAAA is concerned with large area on which EPA is proposing to require the HS mitigations and encourages the EPA to work with FWS to better define the exact locations of listed species and critical habitat.

Thank you for this opportunity to comment.

Sincerely,

Andrew D. Moore
Chief Executive Officer