

## Appendix C

### Case Study: FAA Regulation of Civil Unmanned Aircraft Systems

#### Introduction

In February, 2015, the Department of Transportation's Federal Aviation Administration (FAA) proposed regulations for the operation of small Unmanned Aircraft Systems (UAS) in the National Aviation Airspace (NAS).<sup>1</sup> Small UAS, popularly referred to as "drones," are defined by federal statute as "unmanned aircraft weighing less than 55 pounds."<sup>2</sup> Small UAS consist of the aircraft unit, a control unit, and a communication link between the aircraft and the control unit. Given their size, cost, ability to maneuver where manned aircraft cannot, and other features distinct from manned aircraft, small UAS present enormous potential societal benefits. Examples include improved crop monitoring, power-line inspection, rescue operations, and aerial photography. But small UAS also present significant potential to conflict with existing land and airspace uses as well as other risks to public safety, and this risk profile is different from that of manned aircraft. For example, they are lighter than manned aircraft, making crashes less dangerous, but they are unmanned, making crashes more likely. The expected proliferation of small UAS in public and private business and non-business applications thus raises a concern that some level of regulation will be needed. The FAA's proposed rule is an attempt to address these concerns.

The FAA's proposed rule also represents an opportunity to examine the design of a new permitting system responding to the emergence of a new technology with novel social benefits and risks. Indeed, the background of the rule, as well as the future expected trajectory of UAS regulation, maps remarkably well onto the permit spectrum described in our report and affords an opportunity to evaluate the agency's permitting approach against the criteria developed in the report.

#### Legal Background of UAS Permitting

Current FAA regulations assume aircraft will be manned and thus require each person operating an aircraft to maintain vigilance "so as to see and avoid other aircraft."<sup>3</sup> The FAA has explained that "there is no evidence that those provisions contemplated a pilot fulfilling his or her 'see and avoid' responsibility from outside the aircraft."<sup>4</sup> In particular, an operator of a small UAS might lose line of sight with the UAS, other aircraft, or both. Yet, small UAS clearly fit the statutory definition of aircraft, which is "any contrivance invented, used, or designed to navigate or fly in the air."<sup>5</sup> Subject to limited exceptions, any operator of an aircraft must ensure the aircraft is registered and has an airworthiness certificate and must obtain an airman certificate to operate the aircraft in air commerce, which encompasses a broad range of activities.<sup>6</sup> Although this package of requirements does not have the feel of a conventional permitting program like the Corps' Section 404 program, it meets the definition of permits outlined in our report.

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<sup>1</sup> See 80 Fed. Reg. 9544 (Feb. 23, 2015).

<sup>2</sup> Pub. L. 112-95, § 3.

<sup>3</sup> 14 C.F.R. § 91.113(b).

<sup>4</sup> 80 Fed. Reg. at 9549.

<sup>5</sup> 49 U.S.C. § 40102(a)(6).

<sup>6</sup> See 80 Fed. Reg. at 9549 (discussing these statutory requirements).

Applying these permitting requirements to small UAS would be cumbersome and ineffective. For example, obtaining an airman certificate requires training in a manned aircraft but does not include training on how to fly a UAS.

The FAA first responded to the disconnect between regulation for manned aircraft versus the context of small UAS through a policy, known as AC 91-57, advising that the FAA would exercise its discretion not to prosecute violations by recreational and model UAS operators who follow the policy's guidelines (e.g., fly below 400 feet and avoid churches).<sup>7</sup> This policy did not resolve how to deal with other small UAS.

In 2012, therefore, Congress enacted the FAA Modernization and Reform Act of 2012, section 332 of which directs the FAA to develop regulations allowing civil operation of small non-model UAS in the NAS.<sup>8</sup> Section 333 of the statute also requires the FAA to determine whether certain UAS could operate safely in the NAS based on specified criteria and provided the FAA discretion, based on specified criteria, to allow certain small UAS to operate without an airworthiness certificate.<sup>9</sup> The statute did not specifically address the FAA's authority to exempt small UAS operators from airman certificate licensing or from having to apply for a civil Certificate of Waiver or Authorization (COA) for planned flights.<sup>10</sup>

Pursuant to its new authority, the FAA began granting so-called "Section 333 Exemptions" for a variety of small UAS purposes. Initially the FAA treated these exemption applications like full-blown individual permits, with conditions being worked out for the specific UAS context. This contributed to a backlog of applications that became a concern to the UAS industry.<sup>11</sup> The FAA then began taking steps to streamline and expand the exemption process. On March 23, 2015, the FAA announced that Section 333 exemption holders will be granted a blanket COA allowing the holder to operate under the exemption anywhere in the country, except areas where operations are prohibited by rule, if the UAS is flown at or below 200 feet and remains at least 2 to 5 nautical miles from airports or heliports (depending on the type of airport or heliport).<sup>12</sup> On April 9, 2015, the agency announced that it had begun to use a "summary grant" process under which it continues to review each individual application, but will issue a summary grant where it finds that it has already granted a previous exemption similar to the new request.<sup>13</sup> The FAA also announced that it will allow Section 333 exemption operations by individuals holding a sport or recreational pilot

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<sup>7</sup> See 80 Fed. Reg. at 9550 and 72 Fed. Reg. 6689, 6690 (Feb. 13, 2007).

<sup>8</sup> See Pub L. 112-95, § 332(b). Congress exempted model UAS that adhere to specified criteria from FAA regulation. See *id.* § 336; see also 79 Fed. Reg. 36175 (June 25, 2014) (interpretive rule).

<sup>9</sup> See 80 Fed. Reg. at 9551 (explaining the statutory provisions).

<sup>10</sup> The COA process makes applicable FAA Air Traffic Control facilities aware of proposed UAS operations, and provides the FAA the ability to consider airspace issues unique to UAS operations. See FAA, *UAS Civil COA*, <https://oeaaa.faa.gov/oeaaa/external/uas/portal.jsp>.

<sup>11</sup> As one commentator observed, "on September 25, 2014, FAA granted the first six UAS exemptions....Although FAA received hundreds of applications, it granted only 33 additional approvals between October 2014 and March 2015." Jennifer Nowak, Holland & Knight, *Summary Grant Process Increases Approved Applications Based on Previous Exemption Similarities* (Apr. 27, 2015), [http://www.hklaw.com/publications/FAA-Streamlines-Section-333-Exemption-Process-for-Commercial-UAS-Operations-04-27-2015/?utm\\_source=Mondaq&utm\\_medium=syndication&utm\\_campaign=View-Original](http://www.hklaw.com/publications/FAA-Streamlines-Section-333-Exemption-Process-for-Commercial-UAS-Operations-04-27-2015/?utm_source=Mondaq&utm_medium=syndication&utm_campaign=View-Original).

<sup>12</sup> See FAA, *FAA Streamlines UAS COAs for Section 333*, <https://www.faa.gov/news/updates/?newsId=82245>.

<sup>13</sup> See FAA, *FAA Summary Grants Speed UAS Exemptions*, <https://www.faa.gov/news/updates/?newsId=82485>.

certificate in lieu of a commercial license, the latter being more expensive and time consuming to obtain.<sup>14</sup>

The combination of the summary grants, more flexible licensing, and blanket COA have moved the small UAS approval process along the permit spectrum away from individual permitting and towards general permitting. Individual Section 333 applications are required, but some (perhaps many) will receive summary approval based on pre-defined circumstances,<sup>15</sup> and the blanket COA is in effect a general permit. The relaxed airman licensing requirements, while still requiring individual licensing, involve less difficult and costly training.

The FAA's proposed rules for small UAS would continue this move toward the general permit approach. The proposed rule creates an independent regulatory program for the registration, airworthiness, airman certification, and operation of small UAS. While aircraft registration and operator certification are still required on an individual basis, the rule integrates the terms and conditions for operator certification, which are far less burdensome than for manned aircraft, and simplifies the certification processes compared to rules for manned aircraft operators.<sup>16</sup> The rule would also dispense with the need for individual airworthiness certification process if the terms and conditions of the rule are met, leaving the Section 333 individual and summary grant processes available for UAS operations falling outside the rule's parameters.<sup>17</sup>

Notably, the FAA expressly positioned the proposed rules along a permit spectrum defined by the scale of UAS, with small UAS falling between larger and smaller UAS scales. For larger UAS not covered in the small UAS rule, the agency explained:

the FAA will continue working on integrating UAS operations that pose greater amounts of risk, and will issue notices of proposed rulemaking for those operations once the pertinent issues have been addressed, consistent with the approach set forth in the UAS Comprehensive Plan for Integration and FAA roadmap for integration. Once the entire integration process is complete, the FAA envisions the NAS populated with UAS that operate well beyond the operational limits proposed in this rule. Those UAS will be regulated differently than the UAS that would be integrated through this rule, and will be addressed in subsequent rulemakings. The FAA has selected this approach because it would allow lower-risk small UAS operations to be incorporated into the NAS immediately instead of waiting until the issues associated with higher-risk UAS operations are resolved.<sup>18</sup>

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<sup>14</sup> *See id.*

<sup>15</sup> As of July 24, 2015, the FAA had granted 872 exemptions. See FAA, *Section 333*, [https://www.faa.gov/uas/legislative\\_programs/section\\_333/](https://www.faa.gov/uas/legislative_programs/section_333/).

<sup>16</sup> *See* 80 Fed. Reg. at 9588-89.

<sup>17</sup> *See id.* at 9552, 9565.

<sup>18</sup> *Id.* at 9552. The FAA published its USA Comprehensive Plan in September 2013, outlining the basic approach of integrating different scales of UAS into the FAA NAS program over time. *See* [http://www.faa.gov/about/office\\_org/headquarters\\_offices/agi/reports/media/uas\\_comprehensive\\_plan.pdf](http://www.faa.gov/about/office_org/headquarters_offices/agi/reports/media/uas_comprehensive_plan.pdf).

For smaller scale UAS, the agency posed the adoption of a “micro UAS” category fitting specified parameters including weight, composition, and flight areas,<sup>19</sup> explaining that

because the specific parameters of a micro UAS operation ... would provide additional safety mitigation for those operations, the FAA’s micro UAS approach would allow micro UAS to operate directly over people not involved in the operation. Under the FAA’s micro UAS approach, the operator of a micro UAS also would be able to operate using a UAS airman certificate with a different rating (an unmanned aircraft operator certificate with a micro UAS rating) than the airman certificate that would be created by proposed part 107 [for small UAS]. No knowledge test would be required in order to obtain an unmanned aircraft operator certificate with a micro UAS rating; instead, the applicant would simply submit a signed statement to the FAA stating that he or she has familiarized him or herself with all of the areas of knowledge that are tested on the initial aeronautical knowledge test that is proposed under part 107 [for small UAS].<sup>20</sup>

The FAA received over 4500 comments on the proposed rule from individuals, trade groups and coalitions, and corporations.<sup>21</sup> The comments ranged widely in terms of support and opposition to the rule and the primary issues of concern. Many features of the proposal drew both support and opposition. For example, many potential commercial UAS users objected to the requirement that small UAS operators maintain visual line of sight (VLOS) with the UAS, whereas many individual manned aircraft pilots supported this feature of the rule.<sup>22</sup>

## **Analysis**

It is outside the scope of this case study to evaluate the merits of the FAA’s proposed rule or the comments the agency received. Clearly, however, the comments confirm that the regulation of UAS operation in the NAS is a complex and controversial undertaking. Our focus is on the FAA’s use of an incremental approach to rolling out the UAS regulatory program and how it has positioned different UAS scales along the permitting spectrum, with “micro” closest to general permitting, small UAS being a hybrid, and large scales the FAA will address in the future likely to be closer to individual permitting like that used for manned aircraft. The way the FAA describes these categories and the incremental approach in general maps well onto the risk profile/variance matrix we develop in our report. In particular, the small UAS category, following the conditions in the proposed rule for the general permit, meets our low risk profile/low variance category that is most appropriate for general permitting. The conditions outlined in the proposed rule are designed to reduce the risk of significant harm, and there is likely to be very little difference between operating a small UAS over a cornfield in Iowa compared to over a soybean field in South Carolina. Micro UAS present even lower risks and variance, thus justifying the even more streamlined and simplified permitting the FAA states it is considering. By contrast, large scale

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<sup>19</sup> 80 Fed. Reg. at 9556-58.

<sup>20</sup> *Id.* at 9557-58.

<sup>21</sup> The rulemaking docket is found at <http://www.regulations.gov/#!docketDetail;D=FAA-2015-0150>.

<sup>22</sup> See, for example, the comments submitted by the News Media Coalition, available at <http://www.regulations.gov/#!documentDetail;D=FAA-2015-0150-4534>.

UAS present inherently greater risks and, because they may be operating at higher altitudes, over people and buildings, for longer durations, and with larger payloads, likely will present more context specific risks.

Accordingly, the reasons that we identified in our report for using general permits support the permitting model adopted in the FAA's proposed rule for small UAS.

- *Barriers to Entry:* The commercial use of small UAS is expected to expand into a wide variety of uses by individuals and small businesses and generate significant economic benefits. Imposing a burdensome individual permitting requirement such as is used for manned aircraft would be a significant barrier to individuals and small businesses and would add to the costs of accessing services.
- *Information:* There is no apparent need to impose information reporting requirements on the anticipated uses of small UAS allowed under the proposed rule. The agency will be aware of who is operating small UAS and of the registered aircraft. The low harm/low variance nature of the allowed small UAS uses suggests that there is little additional information of value to be gained by imposing more specific permitting conditions
- *Tailoring:* Operating a small UAS in compliance with the proposed conditions will result in little variation across the landscape and across purposes, thus eliminating the need to tailor to particular circumstances of each use through specific permits.
- *Politics:* Congress has expressed interest in having the FAA develop regulations for UAS. It seems likely that there would have been some pushback had the FAA opted for a specific permit program similar in scope and intensity as for the manned aircraft program. Using a general permit approach for small UAS also reduces the friction that could develop between the agency and the emergent industry in its early stages.
- *Enforcement:* Given their likely number and distribution, enforcement of small UAS standards could be difficult regardless of whether general or specific permitting is used. The FAA cannot feasibly monitor all small UAS uses, and it will be difficult to develop an enforcement record for, say, flying for one minute ten feet above the 400-foot limit. If the FAA becomes aware of a violation, it can impose penalties such as revoking licensure just as easily under the general permit approach as for the specific permit approach.
- *Administrative Discretion:* Given the nature of small UAS operations authorized under the proposed rule, there appears to be little need for significant exercise of administrative discretion or downside to using a general permit approach in terms on constraining the agency. If a significant industry develops around the proposed general permit, however, it may be more difficult for the agency to adjust standards than would be the case under a specific permitting approach.
- *Reducing Regulatory Burdens:* One of the FAA's chief justifications for the approach it proposes for small UAS is to reduce regulatory burdens.

## **Conclusion**

The FAA's proposed rule for small UAS, and the larger incremental approach within which it is placed, is a well-reasoned use of general permitting design. While there may be debate over the precise conditions placed on small UAS, imposing a specific permitting program on small UAS use would likely suppress the development of the industry with little gain in terms of risk reduction. With appropriate conditions, the small UAS general permitting approach reduces both the potential harm and potential variance of small UAS operation. The incremental approach appropriately reserves specific permitting for riskier, more variable large-scale UAS use.