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11
12 **IN THE UNITED STATES DISTRICT COURT**
13 **FOR THE CENTRAL DISTRICT OF CALIFORNIA**

14 **UNITED STATES OF AMERICA**

15 **Plaintiff,**

16 v.

17 **ZHI YONG GUO,**

18 **Defendant.**

19 Case No.
20 CR 08-461-JFW

21 **MOTION TO DISMISS**
22 **INDICTMENT**

23 **TO: THE HONORABLE UNITED STATES DISTRICT COURT FOR THE**
24 **CENTRAL DISTRICT OF CALIFORNIA:**

25 Defendant Zhi Yong Guo, by and through his attorney of record, Fay
26 Arfa, respectfully requests that the Indictment filed on April 18, 2008 be
27 dismissed on various grounds, principally because the indictment fails to
28 state an offense under the laws of the United States. *United States v.*
MacDonald, 435 U.S. 850, 861 n.7, 98 S. Ct. 1547, 56 L. Ed. 2d 18 (1978)

1 (defective indictment may be dismissed).

2 This motion is based upon the attached memorandum of points and
3 authorities, argument, the exhibits, all files and records in this case and
4 such further information as may be provided to the court with respect to
5 this application.

6 DATED: August 7, 2008

7 Respectfully submitted,
8 FAY ARFA, A LAW CORPORATION

9 */s/ Fay Arfa*

10 By: _____
11 Fay Arfa, Attorney at Law

1 **MEMORANDUM OF POINTS AND AUTHORITIES**

2 **I. THE SIXTH AMENDMENT GUARANTEES A CRIMINAL**
3 **DEFENDANT THE FUNDAMENTAL RIGHT TO BE**
4 **INFORMED OF THE NATURE AND CAUSE OF THE**
5 **CHARGES MADE AGAINST HIM**

6 The Sixth Amendment guarantees a criminal defendant the
7 fundamental right to be informed of the nature and cause of the charges
8 made against him so as to permit adequate preparation of a defense. See
9 U.S. Const. Amend. VI ("In all criminal prosecutions, the accused shall
10 enjoy the right . . . to be informed of the nature and cause of the
11 accusation. . . ."); *Cole v. Arkansas*, 333 U.S. 196, 201, 68 S. Ct. 514, 92
12 L. Ed. 644 (1948) ("It is as much a violation of due process to send an
13 accused to prison following conviction of a charge on which he was never
14 tried as it would be to convict him upon a charge that was never made.");
15 *In re Oliver*, 333 U.S. 257, 273, 68 S. Ct. 499, 92 L. Ed. 682 (1948) ("A
16 person's right to reasonable notice of a charge against him, and an
17 opportunity to be heard in his defense -- a right to his day in court -- are
18 basic in our system of jurisprudence. . . ."); *Jackson v. Virginia*, 443 U.S.
19 307, 314, 99 S. Ct. 2781, 61 L. Ed. 2d 560 (1979) ("[A] person cannot incur
20 the loss of liberty for an offense without notice and a meaningful
21 opportunity to defend.").

22 **II. AN INDICTMENT MUST PROVIDE THE DEFENDANT WITH**
23 **A DESCRIPTION OF THE CHARGES AGAINST HIM IN**
24 **SUFFICIENT DETAIL TO ENABLE HIM TO PREPARE HIS**
25 **DEFENSE AND PLEAD DOUBLE JEOPARDY AT A LATER**
26 **PROSECUTION**

27 An indictment must provide the defendant with a description of the
28 charges against him in sufficient detail to enable him to prepare his
 defense and plead double jeopardy at a later prosecution. *Hamling v.*
United States, 418 U.S. 87, 117, 41 L. Ed. 2d 590, 94 S. Ct. 2887 (1974).

1 Two corollary purposes of an indictment are to ensure that the defendant is
2 being prosecuted on the basis of facts presented to the grand jury and to
3 allow the court to determine the sufficiency of the indictment. *United States*
4 *v. Morlan*, 756 F.2d 1442 (9th Cir. 1985); *United States v. Bohonus*, 628
5 F.2d 1167, 1173 (9th Cir.), cert. denied, 447 U.S. 928, 65 L. Ed. 2d 1122,
6 100 S. Ct. 3026 (1980).

7 When determining whether a defendant has received fair notice of
8 the charges against him, courts begin by analyzing the content of the
9 information. See *Cole*, 333 U.S. at 198; see also *James v. Borg*, 24 F.3d
10 20, 24 (9th Cir. 1994) (holding that to determine whether the defendant had
11 adequate notice, "the court looks first to the information," the "principal
12 purpose of [which] is to provide the defendant with a description of the
13 charges against him in sufficient detail to enable him to prepare his
14 defense") (citing *Lincoln v. Sunn*, 807 F.2d 805, 812 (9th Cir. 1987)); cf.
15 *Stirone v. United States*, 361 U.S. 212, 217, 80 S. Ct. 270, 4 L. Ed. 2d
16 252 (1960) (stating that under the Fifth Amendment's right to a grand jury
17 indictment, "a court cannot permit a defendant to be tried on charges that
18 are not made in the indictment against him").

19 In some instances, however, the essential elements of an offense
20 may not be apparent from the statutory language. In *United States v.*
21 *Jackson*, 72 F.3d 1370, 1380 (9th Cir. 1995), cert. denied, 517 U.S. 1157,
22 134 L. Ed. 2d 649, 116 S. Ct. 1546 (1996), the Ninth Circuit held that "an
23 indictment that tracks the words of the statute violated is generally
24 sufficient, but implied, necessary elements, not present in the statutory
25 language, must be included in an indictment." See also, *Russell v. United*
26 *States*, 369 U.S. 749, 8 L. Ed. 2d 240, 82 S. Ct. 1038 (1962) (Indictment

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1 must do more than simply repeat the language of the criminal statute).

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3 **III. THE FEDERAL RULES OF CRIMINAL PROCEDURE**
4 **PROVIDE FOR PRE-TRIAL CHALLENGES TO THE**
5 **SUFFICIENCY OF AN INDICTMENT**

6 Rule 7 of the Federal Rules of Criminal Procedure describes the
7 procedural and substantive requirements for criminal indictments. With
8 respect to the general nature and contents of the indictment, Rule 7
9 provides that the "indictment . . . shall be a plain, concise and definite
10 written statement of the essential facts constituting the offense charged."
11 Fed. R. Cr. P. 7(c)(1)

12 Federal Rules of Criminal Procedure Rule 12(b) allows a defendant
13 to "raise by pretrial motion any defense, objection, or request that the court
14 can determine without a trial of the general issue." Fed. R. Crim. Proc.
15 12(b). Rule 12(b)(3) of the Federal Rules of Criminal Procedure requires
16 certain motions be made prior to trial including motions "alleging a defect in
17 the indictment." Fed. R. Crim. Proc. 12(b)(3)(B).

18 **IV. THE LAW REQUIRES DISMISSAL OF A DEFECTIVE**
19 **INDICTMENT**

20 Dismissal of an indictment is appropriate "when a defendant
21 has been granted immunity from prosecution, *when his indictment is*
22 *defective*, or, usually, when the only evidence against him was seized in
23 violation of the Fourth Amendment." *MacDonald*, 435 U.S. at 861 n.7;
24 italics added.

25 The district court must dismiss an indictment before trial if it fails to
26 allege facts that constitute a prosecutable offense. See, e.g., *United*

1 *States v. Coia*, 719 F.2d 1120, 1123 (11th Cir. 1983), cert. denied, 466
2 U.S. 973, 80 L. Ed. 2d 822, 104 S. Ct. 2349 (1984).

3 An indictment sought under a statute that is unconstitutional on its
4 face or as applied will also be dismissed. See *United States v. Lopez*, 514
5 U.S. 549, 115 S. Ct. 1624, 131 L. Ed. 2d 626 (1995).

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ARGUMENT

I. THE INDICTMENT SHOULD BE DISMISSED BECAUSE NEITHER THE STATUTE NOR THE REGULATIONS CITED IN THE INDICTMENT PROHIBIT THE EXPORTATION OF THERMAL IMAGING CAMERAS TO CHINA

A. Introduction

Neither the statute 50 U.S.C. §§ 1705 (a), (c) (Exh. A) nor the regulations 15 C.F.R. §§ 736.2 (Exh. B), 764.2 (Exh. C.), 774 (Exh. D [relevant portions]) specifically prohibit either exports to China nor export - controlled thermal imaging cameras, nor Photon Model 30 Hz thermal imaging cameras. Therefore, the Indictment fails to state a crime and should be dismissed. *MacDonald*, 435 U.S. at 861 n.7.

B. The Indictment Fails to Show the Department of Commerce Designated the Photon Model 30 Hz Thermal Imaging Camera And/or Thermal Imaging Cameras as Export Controlled And/or Export Controlled to China

Count 1 citing 50 U.S. C. § 1705 (a) and (c) and 15 C.F.R. §§ 736.2, 764.2, 774, alleges that Guo conspired “. . . to export from the United States to China export-controlled thermal imaging cameras without obtaining a license” Count 2, citing the same statute and regulations, alleges that Guo “. . . knowingly and willfully exported and attempted to export from the United States to China, export controlled items, namely ten Photon Model 30 Hz thermal imaging cameras, without having first obtained a license”

The prosecution cites a single statute (50 U.S.C. § 1705 (a) and (c)) and three regulations 15 C.F.R. §§ 736.2, 764.2, 774) in support of the Indictment. However, none of the statutes or regulations cited by the prosecution reference any of the elements of the charges enumerated in

1 the Indictment.

2 According to the prosecution's indictment, Mr. Guo knowingly and
3 willfully committed the following acts:

- 4 1. Exported or attempted to export to China. [Counts 1 and 2]
- 5 2. Export - controlled thermal imaging cameras. [Counts 1 and 2]
- 6 3. Photon Model 30 Hz thermal imaging cameras. [Counts 1 and 2]

7 15 C.F.R. § 736.2's "general prohibitions and determination of
8 applicability" lists five facts that determine the applicability of the general
9 prohibitions. These facts include, classification of the item, destination,
10 end-user, end-use, and conduct. The general prohibitions include the
11 export and reexport of controlled items, of foreign-made items parts, and
12 foreign-produced direct products. Other prohibitions include restrictions on
13 denial orders, end-use end users, embargos, proliferation activity, in
14 transit, violations of orders, terms and conditions, and proceeding with
15 knowledge a violation will occur.

16 None of the five facts or the ten broad categories of prohibitions list
17 either thermal imaging cameras, the Photon Model 30 Hz thermal imaging
18 camera. None of the five facts or ten categories of prohibitions have any
19 restriction about exporting the item to China. Therefore, the indictment
20 currently fails to state a crime involving 15 C.F. R. §736.2.

21 15 C.F.R. § 764.2 criminalizes engaging in prohibited conduct,
22 causing, aiding, or abetting a violation, solicitation and attempt, conspiracy,
23 acting with knowledge of a violation, possession with intent to export
24 illegally, misrepresentation and concealment of facts, evasion, failure to
25 comply with reporting, recordkeeping requirements, license alteration and
26 acting contrary to the terms of a denial order. None of the categories listed

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1 in 15 C.F.R. § 764.2 list either thermal imaging cameras, the Photon Model
2 30 Hz thermal imaging camera or any restriction about exporting the item
3 to China.

4 15 C.F.R. § 774, the Commerce Control List (“CCL”) contains ten
5 broad categories including (0) nuclear materials, facilities and equipment
6 (1) materials, chemicals, microorganisms and toxins (2) Materials
7 processing (3) electronics (4) computers (5) telecommunications and
8 information security (6) sensors and lasers (7) navigation and avionics (8)
9 marine (9) propulsion systems, space vehicles, and related equipment.

10 The CCL then divides each category into five product grounds (a) systems,
11 equipment and components (b) test, inspection and production equipment
12 (c) material (d) software and (e) technology. The indictment fails to show if
13 and where the Commerce Control List lists thermal imaging cameras
14 and/or Photon Model 30 Hz thermal imaging cameras as a prohibited item.
15 (Exh. D [relevant portions].)

16 None of the cited statutes and regulations prohibit the exportation of
17 controlled thermal imaging cameras or the Photon Model 30 Hz thermal
18 imaging cameras to China. Because the conduct alleged fails to constitute
19 a violation of the substantive statute, the alleged agreement to do the act
20 cannot constitute a conspiracy to violate that statute. *United States v.*
21 *Irwin*, 654 F.2d 671, 679-680 (10th Cir. 1981), cert. denied, 455 U.S.
22 1016, 72 L. Ed. 2d 133, 102 S. Ct. 1709 (1982). Therefore, the indictment
23 should be dismissed.

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1 50 U.S.C. § 1705 (a) lists several ways the statute can be violated.
2 For example, the statute criminalizes the violation of any license, order,
3 regulation, or prohibition issued under this title [50 U.S.C. §§ 1701 et seq.]
4 . . . “ Mr. Guo cannot determine, based on the vagueness of the
5 Indictment whether the prosecution accuses him of violating either a
6 license, order, or regulation or prohibition issued under 50 U.S.C. §§ 1701
7 et seq.].

8 For example, *United States v Reyes*, 270 F3d 1158 (7th Cir. 2001)
9 concerned the Arms Export Control Act (AECA), 22 U.S.C. § 2778, and its
10 regulations, the International Traffic in Arms Regulations, 22 C.F.R. § 120-
11 30 which authorized President to regulate and control the exportation of
12 military and defense products through a licensing system. The licensing
13 system required a license before the export of any products or items
14 designated as "defense articles" on the United States Munitions List. 22
15 C.F.R. § 121.1. Category VIII(h) of the Munitions List required State
16 Department licenses for the exportation of "components, parts,
17 accessories, attachments and associated equipment" designed or
18 modified for use on military aircraft. 22 C.F.R. § 121.1. The Federal
19 regulations had a stated policy to deny requests for licenses to export
20 defense articles at any given time destined for certain specified countries,
21 including Iran. 22 C.F.R. § 126.1(a).

22 Here, to confuse matters, 15 C.F.R. § 736.2, issued under the
23 authority of IEEPA describes several general prohibitions and
24 determination of applicability. 15 C.F.R. § 736.2 also describes the
25 classification of the items and contains additional ten prohibitions, dealing
26 with exports and reexports, parts and components reexports,

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1 foreign-produced direct product reexports, denial orders, end-use end-
2 user, embargo, U.S. person proliferation activity, in transit, orders, terms,
3 and conditions, and knowledge violation to occur.

4 To confuse matters even more, 15 C.F.R. § 764.2 criminalizes
5 several kinds of conduct, including engaging in prohibited conduct,
6 causing, aiding, or abetting a violation, solicitation and attempt, conspiracy,
7 acting with knowledge of a violation, possession with intent to export
8 illegally, misrepresentation and concealment of facts, evasion, failure to
9 comply with reporting, recordkeeping requirements, license alteration and
10 acting contrary to the terms of a denial order.

11 15 C.F.R. § 774, the CCL, contains ten broad categories including (0)
12 nuclear materials, facilities and equipment (1) materials, chemicals,
13 microorganisms and toxins (2) Materials processing (3) electronics (4)
14 computers (5) telecommunications and information security (6) sensors
15 and lasers (7) navigation and avionics (8) marine (9) propulsion systems,
16 space vehicles, and related equipment. The CCL then divides each
17 category into five product grounds (a) systems, equipment and
18 components (b) test, inspection and production equipment (c) material (d)
19 software and (e) technology.

20 Mr. Guo recognizes that the indictment contained an introduction,
21 containing eight paragraphs. However, the indictment also lists a statute
22 and three regulations that can be violated in several ways. The following
23 chart lists at least 85 ways, not including subcategories of violations,
24 Counts One and/or Two can be violated:

	50 U.S.C. § 1705(a) license	50 U.S.C. § 1705(a) order	50 U.S.C. § 1705(a) regulation	50 U.S.C. § 1705(a) prohibition
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15 CFR § 736.2 general prohibitions	1	2	3	4
15 CFR § 736.2 applicability	5	6	7	8
15 CFR § 736.2 Item classification	9	10	11	12
15 CFR § 736.2 export prohibitions	13	14	15	16
15 CFR § 736.2 reexports, parts components reexports	17	18	19	20
15 CFR § 736.2 foreign-produced direct product reexports	21	22	23	24
15 CFR § 736.2 denial orders	25	26	26	28
15 CFR § 736.2 end-use end-user	29	30	31	32
15 CFR § 736.2 embargo	33	34	35	36
15 CFR § 736.2 U.S. person proliferation activity	37	38	39	40
15 CFR § 736.2 in transit	41	42	43	44
15 CFR § 736.2 orders, terms, conditions	45	46	47	48
15 CFR § 736.2 knowledge of violation	50	51	52	53
15 C.F.R. § 764.2 engaging in prohibited conduct	54	55	56	57
15 C.F.R. § 764.2 causing, aiding, or abetting a violation re denial order.	58	59	60	61
15 C.F.R. § 764.2 solicitation and attempt	62	63	64	65
15 C.F.R. § 764.2 conspiracy	66	67	68	69

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15 C.F.R. § 764.2, possession with intent to export illegally	70	71	72	73
15 C.F.R. § 764.2 misrepresentation and concealment of facts.	74	75	76	77
15 C.F.R. § 764.2 evasion	78	79	80	81
15 C.F.R. § 764.2 failure to comply with reporting, recordkeeping requirements	82	83	84	85

The Indictment in this case fails to provide sufficient notice of the pending charges. The government lists a single statute and three regulations. Mr. Guo cannot determine whether the prosecution charges him with a violation of 50 U.S. C. § 1705, 15 C.F.R. § 736.2, 15 C.F.R. § 764.2 and/or 15 C.F.R. § 774. The Indictment fails to inform Mr. Guo which of these violations he allegedly committed and he should not have to speculate in this regard. See *Hamling*, 418 U.S. at 117. The Indictment fails to sufficiently apprise Mr. Guo of what he had to be prepared to meet in his criminal prosecution, violate Mr. Guo's Sixth Amendment rights and should be dismissed.

1 specific provision of the statute by regulation, " and "[s]uch elucidate a
2 specific provision of the statute by regulation, " and "[s]uch legislative
3 regulations are given controlling weight unless they are arbitrary,
4 capricious, or manifestly contrary to the statute." *Chevron*, 467 U.S. at 843-
5 44.

6 When reviewing regulations, where "there is an express delegation of
7 authority to the agency to elucidate a specific provision of the statute by
8 regulation . . . [s]uch legislative regulations are given controlling weight
9 unless they are arbitrary, capricious, or manifestly contrary to the statute."
10 *Chevron*, 467 U.S. at 843-44; see *Dykstra v. Comm'r*, 260 F.3d 1181, 1182
11 (9th Cir. 2001) (per curiam) (applying the *Chevron* standard in the context
12 of tax regulations).

13 **C. The Rule of Lenity**

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15 The rule of lenity mandates that ambiguity in criminal statutes be
16 resolved in favor of lenity for the accused. See *Dowling v. United States*,
17 473 U.S. 207, 213-4, 105 S. Ct. 3127, 87 L. Ed. 2d 152 (1985) ("When a
18 choice has to be made between two readings of what conduct Congress
19 has made a crime, it is appropriate, before we choose the harsher
20 alternative, to require that Congress should have spoken in language that
21 is clear and definite." [citations omitted])

22 The rule of lenity can apply in civil statutes which have criminal
23 applications, as well as in purely penal statutes. See *United States v.*
24 *Thompson/Center Arms*, 504 U.S. 505, 517-518, 112 S. Ct. 2102, 119 L.
25 Ed. 2d 308, 319 (1992) (holding that the rule of lenity applies to the
26 interpretation of an ambiguous provision of the National Firearms Act, a
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1 civil statute with criminal provisions).

2 **D. The EARs Contain Their Own Set of Violations and**
3 **Sanctions.**

4 Here, like the penal provisions of IEEPA, the EARs also contain the
5 requirement of knowing or willful conduct. The difference lies in the
6 penalty.

7 15 C.F.R. § 764.2 (a) - (k) contains a list of violations. The statute
8 prohibits engaging in prohibited conduct, causing, aiding, or abetting a
9 violation, solicitation and attempt, conspiracy, acting with knowledge of a
10 violation, possession with intent to export illegally, misrepresentation and
11 concealment of facts, evasion, failure to comply with reporting,
12 recordkeeping requirements, license, license alteration and/or acting
13 contrary to the terms of a denial order.

14 15 C.F.R. §764.3 contains its own set of sanctions, including
15 administrative sanctions and criminal penalties. (Exh. E.) Administrative
16 sanctions include civil monetary penalties, denial of export privileges, and
17 exclusion from practice. Criminal penalties include a fine not more than
18 five times the value of the exports or reexports involved or \$50,000,
19 whichever is greater, or imprisoned not more than five years, or both.

20 The criminal penalties set forth in the EARs subject willful violations
21 to a fine not more than five times the value of the export or reexport
22 involved or \$1,000,000, whichever is greater; and, in the case of an
23 individual, a fine of not more than \$250,000, or imprisonment not more
24 than 10 years, or both. Under another relevant criminal penalty section of
25 the EARs, conduct that violates the EAA, the EAR, or any order, license or
26 authorization, may also be prosecuted under other provisions of law,

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1 including 18 U.S.C. 371 (conspiracy carrying a five year maximum penalty)
2 (conspiracy). Other sanctions include restrictions on imports and
3 procurement, seizure and forfeiture and cross-debarment.

4 **E. Under Either *Chevron* or the Rule of Lenity, the EARs Not**
5 **the Statute Control the Violations and the Sanctions**

6 *Chevron*, 467 U.S. at 843-44, entitles the EARs to deference over 50
7 U.S. C. § 1705 (c). On August 17, 2001, the International Emergency
8 Economic Powers Act (“IEEPA”), Title 50, United States Code, sections
9 1701 - 1706, granted the President the authority to deal with threats to the
10 United States. On August 17, 2001, under the IEEPA authority, the
11 President issued Executive Order 13222, which declared a national
12 emergency and extended the Export Administration Act of 1979, through
13 the promulgation of the Export Administration Regulations (“EAR”) set forth
14 at Title 15, Code of Federal Regulations, Parts 730-774. On August 15,
15 2007, the President issued an Executive Notice extending the national
16 emergency declared in EO 13222. (Exh. F.)

17 15 CFR 764.3 deals with sanctions for violations of the EARs and
18 satisfies the requirements for *Chevron* deference and should receive
19 deference over the statute. Here, Congress expressly left a gap for an
20 agency to fill and expressly delegated to the Department of Commerce the
21 authority to elucidate the specific provisions of the statute by regulation.
22 The regulations should be given controlling weight since they are not
23 arbitrary, capricious, or manifestly contrary to the statute. 467 U.S. at 844.
24 *Chevron* deference applies.

25 Similarly, under the rule of lenity, any ambiguity in criminal statutes
26 should be resolved in favor of lenity for the accused. Here, the rule of

1 lenity requires that the specific violations and sanctions set forth in the
2 EARs trump any general violations and sanctions set forth in 50 U.S.C. §
3 1705(c). See *Thompson/Center Arms*, 504 U.S. at 517-518.

4 Therefore, 50 C.F.R. § 1705 (c) should be stricken from the
5 indictment.

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CONCLUSION

Therefore, Mr. Guo respectfully requests that his Motion to Dismiss the Indictment be denied.

DATED: August 11, 2008

Respectfully submitted,
FAY ARFA, A LAW CORPORATION

/s/ Fay Arfa

By: _____
Fay Arfa, Attorney at Law

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EXHIBIT A

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50 U.S.C. § 1705 provides in relevant part:

(a) Unlawful acts. It shall be unlawful for a person to violate, attempt to violate, conspire to violate, or cause a violation of any license, order, regulation, or prohibition issued under this title [50 U.S.C. §§ 1701 et seq.].

(c) Criminal penalty. A person who willfully commits, willfully attempts to commit, or willfully conspires to commit, or aids or abets in the commission of, an unlawful act described in subsection (a) shall, upon conviction, be fined not more than \$ 1,000,000, or if a natural person, may be imprisoned for not more than 20 years, or both.

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EXHIBIT B

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2 15 C.F.R. 736.2 General prohibitions and determination of
3 applicability.

4 (a) *Information or facts that determine the applicability of the*
5 *general prohibitions.* The following five types of facts determine
6 your obligations under the ten general prohibitions and the EAR
7 generally:

8 (1) *Classification of the item.* The classification of the item
9 on the Commerce Control List (see part 774 of the EAR);

10 (2) *Destination.* The country of ultimate destination for an
11 export or reexport (see parts 738 and 774 of the EAR
12 concerning the Country Chart and the Commerce Control List);

13 (3) *End-user.* The ultimate end user (see General
14 Prohibition Four (paragraph (b)(4) of this section) and
15 Supplement No. 1 to part 764 of the EAR for references to
16 persons with whom your transaction may not be permitted; see
17 General Prohibition Five (Paragraph (b)(5) of this section) and
18 part 744 for references to end-users for whom you may need
19 an export or reexport license)

20 (4) *End-use.* The ultimate end-use (see General
21 Prohibition Five (paragraph (b)(5) of this section) and part 744
22 of the EAR for general end-use restrictions); and

23 (5) *Conduct.* Conduct such as contracting, financing, and
24 freight forwarding in support of a proliferation project as
25 described in part 744 of the EAR.

26 (b) *General prohibitions.* The following ten general
27 prohibitions describe certain exports, reexports, and other
28 conduct, subject to the scope of the EAR, in which you may not
engage unless you either have a license from the Bureau of
Industry and Security (BIS) or qualify under part 740 of the
EAR for a License Exception from each applicable general
prohibition in this paragraph. The License Exceptions at part
740 of the EAR apply only to General Prohibitions One (Exports
and Reexports in the Form Received), Two (Parts and
Components Reexports), and Three (Foreign-Produced Direct
Product Reexports); however, selected License Exceptions are
specifically referenced and authorized in part 746 of the EAR concerning
embargo destinations and in §744.2(c) of the EAR regarding nuclear end-
uses.

(1) *General Prohibition One—Export and reexport of
controlled items to listed countries (Exports and Reexports).*
You may not, without a license or License Exception, export
any item subject to the EAR to another country or reexport any

1 item of U.S.-origin if each of the following is true:

2 (i) The item is controlled for a reason indicated in the
3 applicable Export Control Classification Number (ECCN), and

4 (ii) Export to the country of destination requires a license
5 for the control reason as indicated on the Country Chart at part
6 738 of the EAR. (The scope of this prohibition is determined by
7 the correct classification of your item and the ultimate
8 destination as that combination is reflected on the Country
9 Chart.)¹ Note that each License Exception described at part
10 740 of the EAR supersedes General Prohibition One if all terms
11 and conditions of a given License Exception are met by the
12 exporter or reexporter.

13 ¹ See part 738 of the EAR for selected controls that are not
14 specified on the Country Chart.

15 (2) *General Prohibition Two—Reexport and export from*
16 *abroad of foreign-made items incorporating more than a de*
17 *minimis amount of controlled U.S. content (Parts and*
18 *Components Reexports). (i) You may not, without a license or*
19 *License Exception, export, reexport or export from abroad any*
20 *foreign-made commodity, software, or technology incorporating*
21 *U.S.-origin commodities, software, or technology respectively*
22 *that is controlled to the country of ultimate destination if the*
23 *foreign-made item meets all three of the following conditions:*

24 (A) It incorporates more than the *de minimis* amount of
25 controlled U.S. content, as defined in §734.4 of the EAR
26 concerning the scope of the EAR;

27 (B) It is controlled for a reason indicated in the applicable
28 ECCN; and

(C) Its export to the country of destination requires a
license for that control reason as indicated on the Country
Chart. (The scope of this prohibition is determined by the
correct classification of your foreign-made item and the ultimate
destination, as that combination is reflected on the Country
Chart.)

(ii) Each License Exception described in part 740 of the
EAR supersedes General Prohibition Two if all terms and
conditions of a given License Exception are met by the exporter
or reexporter.

(3) *General Prohibition Three—Reexport and export from*
abroad of the foreign-produced direct product of U.S.
technology and software (Foreign-Produced Direct Product
Reexports).

(i) *Country scope of prohibition.* You may not, without a

1 license or License Exception, reexport or export from abroad
2 items subject to the scope of this General Prohibition Three to
3 Cuba or a destination in Country Group D:1 (See Supplement
4 No. 1 to part 740 of the EAR).

5 (ii) *Product scope of foreign-made items subject to*
6 *prohibition.* This General Prohibition 3 applies if an item meets
7 either the Conditions defining the direct product of technology
8 or the Conditions defining the direct product of a plant in
9 paragraph (b)(3)(ii)(A) of this section:

10 (A) *Conditions defining direct product of technology.*
11 Foreign-made items are subject to this General Prohibition 3 if
12 they meet both of the following conditions:

13 (1) They are the direct product of technology or software
14 that requires a written assurance as a supporting document for
15 a license, as defined in paragraph (o)(3)(I) of Supplement No. 2
16 to part 748 of the EAR, or as a precondition for the use of
17 License Exception TSR at §740.6 of the EAR, and

18 (2) They are subject to national security controls as
19 designated on the applicable ECCN of the Commerce Control
20 List at part 774 of the EAR.

21 (B) *Conditions defining direct product of a plant.* Foreign-
22 made items are also subject to this General Prohibition 3 if they
23 are the direct product of a complete plant or any major component of a plant

24 (1) Such plant or component is the direct product of
25 technology that requires a written assurance as a supporting
26 document for a license or as a precondition for the use of
27 License Exception TSR in §740.6 of the EAR, and

28 (2) Such foreign-made direct products of the plant or
component are subject to national security controls as
designated on the applicable ECCN of the Commerce Control
List at part 774 of the EAR.

(iii) *License Exceptions.* Each License Exception
described at part 740 of the EAR supersedes this General
Prohibition Three if all terms and conditions of a given
exception are met by the exporter or reexporter.

(4) *General Prohibition Four (Denial Orders)—Engaging
in actions prohibited by a denial order.*

(I) You may not take any action that is prohibited by a
denial order issued under part 766 of the EAR, Administrative
Enforcement Proceedings. These orders prohibit many actions
in addition to direct exports by the person denied export
privileges, including some transfers within a single country,

1 either in the United States or abroad, by other persons. You are
2 responsible for ensuring that any of your transactions in which
3 a person who is denied export privileges is involved do not
4 violate the terms of the order. Orders denying export privileges
5 are published in the Federal Register when they are issued and
6 are the legally controlling documents in accordance with their
7 terms. BIS also maintains compilations of persons denied
8 export privileges on its Web site at <http://www.bis.doc.gov> . BIS
9 may, on an exceptional basis, authorize activity otherwise
10 prohibited by a denial order. See §764.3(a)(2) of the EAR.

11 (ii) There are no License Exceptions described in part
12 740 of the EAR that authorize conduct prohibited by this
13 General Prohibition Four.

14 (5) *General Prohibition Five—Export or reexport to
15 prohibited end-uses or end-users (End-Use End-User)*. You
16 may not, without a license, knowingly export or reexport any
17 item subject to the EAR to an end-user or end-use that is
18 prohibited by part 744 of the EAR.

19 (6) *General Prohibition Six—Export or reexport to
20 embargoed destinations (Embargo)*. (I) You may not, without a
21 license or License Exception authorized under part 746, export
22 or reexport any item subject to the EAR to a country that is
23 embargoed by the United States or otherwise made subject to
24 controls as both are described at part 746 of the EAR.

25 (ii) License Exceptions to General Prohibition Six are
26 described in part 746 of the EAR, on Embargoes and Other
27 Special Controls. Unless a License Exception or other
28 authorization is authorized in part 746 of the EAR, the License
Exceptions described in part 740 of the EAR are not available
to overcome this general prohibition.

(7) *General Prohibition Seven—Support of proliferation
activities (U.S. person proliferation activity)* —(I) *Support of
proliferation activities (U.S. person proliferation activity)*. (A) If
you are a U.S. person as that term is defined in §744.6(c) of
the EAR, you may not engage in any activities prohibited by
§744.6(a) or (b) of the EAR, which prohibits the performance,
without a license from BIS, of certain financing, contracting,
service, support, transportation, freight forwarding, or
employment that you know will assist in certain proliferation
activities described further in part 744 of the EAR. There are no
License Exceptions to this General Prohibition Seven in part
740 of the EAR unless specifically authorized in that part.

(B) If you are a U.S. person as that term is defined in
§744.6(c) of the EAR, you may not export a Schedule 1
chemical listed in Supplement No. 1 to Part 745 without first
complying with the provisions of §§742.18 and 745.1 of the

1 EAR.

2 (C) If you are a U.S. person as that term is defined in
3 §744.6(c) of the EAR, you may not export a Schedule 3
4 chemical listed in Supplement No. 1 to Part 745 to a destination
5 not listed in Supplement No. 2 to Part 745 without complying
6 with the End-Use Certificate requirements in §745.2 of the EAR
7 that apply to Schedule 3 chemicals controlled for CW reasons
8 in ECCN 1C350, ECCN 1C355, or ECCN 1C395.

9 (8) *General Prohibition Eight—In transit shipments and*
10 *items to be unladen from vessels or aircraft (In transit). (I)*
11 *Unlading and shipping in transit.* You may not export or
12 reexport an item through or transit through a country listed in
13 paragraph (b)(8)(ii) of this section unless a License Exception
14 or license authorizes such an export or reexport directly to such
15 a country of transit, or unless such an export or reexport is
16 eligible to such a country of transit without a license.

17 (ii) *Country scope.* This General Prohibition Eight applies
18 to Albania, Armenia, Azerbaijan, Belarus, Cambodia, Cuba,
19 Georgia, Kazakhstan, Kyrgyzstan, Laos, Mongolia, North
20 Korea, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan,
21 Vietnam.

22 (9) *General Prohibition Nine—Violation of any order,*
23 *terms, and conditions (Orders, Terms, and Conditions).* You
24 may not violate terms or conditions of a license or of a License
25 Exception issued under or made a part of the EAR, and you
26 may not violate any order issued under or made a part of the
27 EAR. There are no License Exceptions to this General
28 Prohibition Nine in part 740 of the EAR. Supplements Nos. 1
and 2 to this part provide for certain General Orders and
Administrative Orders.

(10) *General Prohibition Ten—Proceeding with*
transactions with knowledge that a violation has occurred or is
about to occur (Knowledge Violation to Occur). You may not
sell, transfer, export, reexport, finance, order, buy, remove,
conceal, store, use, loan, dispose of, transfer, transport,
forward, or otherwise service, in whole or in part, any item
subject to the EAR and exported or to be exported with
knowledge that a violation of the Export Administration
Regulations, the Export Administration Act or any order,
license, License Exception, or other authorization issued
thereunder has occurred, is about to occur, or is intended to
occur in connection with the item. Nor may you rely upon any
license or License Exception after notice to you of the
suspension or revocation of that license or exception. There
are no License Exceptions to this General Prohibition Ten in
part 740 of the EAR.

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EXHIBIT C

1
2 15 C.F.R. § 764.2 Violations.

3 (a) *Engaging in prohibited conduct.* No person may engage in
4 any conduct prohibited by or contrary to, or refrain from
engaging in any conduct required by, the EAA, the EAR, or any
order, license or authorization issued thereunder.

5 (b) *Causing, aiding, or abetting a violation.* No person may
6 cause or aid, abet, counsel, command, induce, procure, or
7 permit the doing of any act prohibited, or the omission of any
act required, by the EAA, the EAR, or any order, license or
authorization issued thereunder.

8 (c) *Solicitation and attempt.* No person may solicit or attempt a
violation of the EAA, the EAR, or any order, license or
authorization issued thereunder.

9 (d) *Conspiracy.* No person may conspire or act in concert with
10 one or more persons in any manner or for any purpose to bring
about or to do any act that constitutes a violation of the EAA,
the EAR, or any order, license or authorization issued
thereunder.

11 (e) *Acting with knowledge of a violation.* No person may order,
12 buy, remove, conceal, store, use, sell, loan, dispose of,
13 transfer, transport, finance, forward, or otherwise service, in
whole or in part, any item exported or to be exported from the
United States, or that is otherwise subject to the EAR, with
14 knowledge that a violation of the EAA, the EAR, or any order,
license or authorization issued thereunder, has occurred, is
15 about to occur, or is intended to occur in connection with the
item.

16 (f) *Possession with intent to export illegally.* No person may
possess any item controlled for national security or foreign
policy reasons under sections 5 or 6 of the EAA:

17 (1) With intent to export or reexport such item in violation of the
18 EAA, the EAR, or any order, license or authorization issued
thereunder; or

19 (2) With knowledge or reason to believe that the item would be
so exported or reexported.

20 (g) *Misrepresentation and concealment of facts.* (1) No person
may make any false or misleading representation, statement,
21 or certification, or falsify or conceal any material fact, either
directly to BIS, the United States Customs Service, or an
22 official of any other United States agency, or indirectly through
any other person:

23 (i) In the course of an investigation or other action subject
to the EAR; or

24 (ii) In connection with the preparation, submission,
issuance, use, or maintenance of any export control document
25 as defined in §772.1, or any report filed or required to be filed
pursuant to §760.5 of the EAR; or

26 (iii) For the purpose of or in connection with effecting an
export, reexport or other activity subject to the EAR.

27 (2) All representations, statements, and certifications made by

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any person are deemed to be continuing in effect. Every person who has made any representation, statement, or certification must notify BIS and any other relevant agency, in writing, of any change of any material fact or intention from that previously represented, stated, or certified, immediately upon receipt of any information that would lead a reasonably prudent person to know that a change of material fact or intention has occurred or may occur in the future.

(h) *Evasion*. No person may engage in any transaction or take any other action with intent to evade the provisions of the EAA, the EAR, or any order, license or authorization issued thereunder.

(l) *Failure to comply with reporting, recordkeeping requirements*. No person may fail or refuse to comply with any reporting or recordkeeping requirement of the EAR or of any order, license or authorization issued thereunder.

(j) *License alteration*. Except as specifically authorized in the EAR or in writing by BIS, no person may alter any license, authorization, export control document, or order issued under the EAR.

(k) *Acting contrary to the terms of a denial order*. No person may take any action that is prohibited by a denial order. See §764.3(a)(2) of this part.

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EXHIBIT D

2 **CATEGORY 6 - SENSORS AND LASERS**

Related Definitions: N/A

Items:

3 **A. SYSTEMS, EQUIPMENT AND**
4 **COMPONENTS**

a. Marine acoustic systems, equipment and specially designed components therefor, as follows:

5 **6A001 Acoustics.**

6 **License Requirements**

a.1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:

7 *Reason for Control:* NS, AT

8 *Control(s)* Country Chart

Note: 6A001.a.1 does not control:

9 NS applies to entire entry NS Column 2

10 AT applies to entire entry AT Column 1

a. *Depth sounders operating vertically below the apparatus, not including a scanning function exceeding ± 20°, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;*

11 **License Requirement Notes:** See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

b. *Acoustic beacons, as follows:*

12 **License Exceptions**

1. *Acoustic emergency beacons;*

13 LVS: \$3000; N/A for 6A001.a.1.b.1 object
14 detection and location systems having
15 a transmitting frequency below 5 kHz
16 or a sound pressure level exceeding
17 210 dB (reference 1 µPa at 1 m) for
18 equipment with an operating
19 frequency in the band from 30 kHz to
20 2 kHz inclusive; 6A001.a.2.a.1,
21 a.2.a.2, 6A001.a.2.a.3, a.2.a.5,
22 a.2.a.6, 6A001.a.2.b; processing
23 equipment controlled by 6A001.a.2.c,
24 and specially designed for real time
25 application with towed acoustic
26 hydrophone arrays; a.2.e.1, a.2.e.2;
27 and bottom or bay cable systems
28 controlled by 6A001.a.2.f and having
processing equipment specially
designed for real time application
with bottom or bay cable systems.

2. *Pingers specially designed for relocating or returning to an underwater position.*

a.1.a. Wide-swath bathymetric survey systems designed for sea bed topographic mapping, having all of the following:

a.1.a.1. Being designed to take measurements at an angle exceeding 20° from the vertical;

a.1.a.2. Being designed to measure depths exceeding 600 m below the water surface; *and*

a.1.a.3. Being designed to provide any of the following:

a.1.a.3.a. Incorporation of multiple beams any of which is less than 1.9°; *or*

a.1.a.3.b. Data accuracies of better than 0.3% of water depth across the swath averaged over the individual measurements within the swath;

GBS: Yes for 6A001.a.1.b.4

CIV: Yes for 6A001.a.1.b.4

25 **List of Items Controlled**

26 *Unit:* \$ value

27 *Related Controls:* See also [6A991](#)

2 a.1.b. Object detection or location
3 systems having any of the following:

4 a.1.b.1. A transmitting frequency
5 below 10 kHz;

6 a.1.b.2. Sound pressure level
7 exceeding 224dB (reference 1 μPa at 1 m) for
8 equipment with an operating frequency in the
9 band from 10 kHz to 24 kHz inclusive;

10 a.1.b.3. Sound pressure level
11 exceeding 235 dB (reference 1 μPa at 1 m) for
12 equipment with an operating frequency in the
13 band between 24 kHz and 30 kHz;

14 a.1.b.4. Forming beams of less than
15 1° on any axis and having an operating frequency
16 of less than 100 kHz;

17 a.1.b.5. Designed to operate with an
18 unambiguous display range exceeding 5,120 m; *or*

19 a.1.b.6. Designed to withstand
20 pressure during normal operation at depths
21 exceeding 1,000 m and having transducers with
22 any of the following:

23 a.1.b.6.a. Dynamic compensation
24 for pressure; *or*

25 a.1.b.6.b. Incorporating other than
26 lead zirconate titanate as the transduction element;

27 a.1.c. Acoustic projectors, including
28 transducers, incorporating piezoelectric,
magnetostrictive, electrostrictive, electrodynamic
or hydraulic elements operating individually or in
a designed combination, having any of the
following:

Notes: 1. The control status of acoustic
projectors, including transducers, specially
designed for other equipment is determined by the
control status of the other equipment.

2. 6A001.a.1.c does not control electronic
sources that direct the sound vertically only, or
mechanical (e.g., air gun or vapor-shock gun) or
chemical (e.g., explosive) sources.

a.1.c.1. An instantaneous radiated
acoustic power density exceeding 0.01
mW/mm²/Hz for devices operating at frequencies
below 10 kHz;

a.1.c.2. A continuously radiated
acoustic power density exceeding 0.001
Mw/mm²/Hz for devices operating at frequencies
below 10 kHz; *or*

Technical Note: *Acoustic power density is
obtained by dividing the output acoustic power by
the product of the area of the radiating surface and
the frequency of operation.*

a.1.c.3. Side-lobe suppression
exceeding 22 dB;

a.1.d. Acoustic systems, equipment and
specially designed components for determining the
position of surface vessels or underwater vehicles
designed to operate at a range exceeding 1,000 m
with a positioning accuracy of less than 10 m rms
(root mean square) when measured at a range of
1,000 m;

Note: 6A001.a.1.d includes:

a. Equipment using coherent “signal
processing” between two or more beacons and the
hydrophone unit carried by the surface vessel or
underwater vehicle;

b. Equipment capable of automatically
correcting speed-of-sound propagation errors for
calculation of a point.

a.2. Passive (receiving, whether or not related
in normal application to separate active equipment)
systems, equipment and specially designed
components therefor, as follows:

a.2.a. Hydrophones having any of the
following characteristics:

Note: *The control status of hydrophones
specially designed for other equipment is
determined by the control status of the other
equipment.*

a.2.a.1. Incorporating continuous flexible sensing elements;

field with an rms pressure of 1 μ Pa. For example, a hydrophone of -160 dB (reference 1 V per μ Pa) would yield an output voltage of 10^{-8} V in such a field, while one of -180 dB sensitivity would yield only 10^{-9} V output. Thus, -160 dB is better than -180 dB.

a.2.a.2. Incorporating flexible assemblies of discrete sensing elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;

a.2.b. Towed acoustic hydrophone arrays having any of the following:

a.2.a.3. Having any of the following sensing elements:

a.2.b.1. Hydrophone group spacing of less than 12.5 m or ‘able to be modified’ to have hydrophone group spacing of less than 12.5 m;

a.2.a.3.a. Optical fibers; *or*

a.2.b.2. Designed or ‘able to be modified’ to operate at depths exceeding 35m;

a.2.a.3.b. Piezoelectric polymer films other than polyvinylidene-fluoride (PVDF) and its co-polymers {P(VDF-TrFE) and P(VDF-TFE)}; *or*

Technical Note: “Able to be modified” in 6A001.a.2.b means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.

a.2.a.3.c. Flexible piezoelectric composites;

a.2.a.4. A hydrophone sensitivity better than -180dB at any depth with no acceleration compensation;

a.2.a.5. When designed to operate at depths exceeding 35 m with acceleration compensation; *or*

a.2.b.3. Heading sensors controlled by 6A001.a.2.d;

a.2.a.6. Designed for operation at depths exceeding 1,000 m;

a.2.b.4. Longitudinally reinforced array hoses;

Technical Notes: 1. ‘Piezoelectric polymer film’ sensing elements consist of polarized polymer film that is stretched over and attached to a supporting frame or spool (mandrel).

a.2.b.5. An assembled array of less than 40 mm in diameter;

2. ‘Flexible piezoelectric composite’ sensing elements consist of piezoelectric ceramic particles or fibers combined with an electrically insulating, acoustically transparent rubber, polymer or epoxy compound, where the compound is an integral part of the sensing elements.

a.2.b.6. Multiplexed hydrophone group signals designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; *or*

3. Hydrophone sensitivity is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic

a.2.b.7. Hydrophone characteristics controlled by 6A001.a.2.a;

a.2.c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having “user accessible programmability” and time or frequency domain processing and correlation, including spectral analysis, digital filtering and

2 beamforming using Fast Fourier or other
3 transforms or processes;

4 a.2.d. Heading sensors having all of the
5 following:

6 a.2.d.1. An accuracy of better than \pm
7 0.5° ; and

8 a.2.d.2. Designed to operate at
9 depths exceeding 35 m or having an adjustable or
10 removable depth sensing device in order to
11 operate at depths exceeding 35 m;

12 a.2.e. Bottom or bay cable systems
13 having any of the following:

14 a.2.e.1. Incorporating hydrophones
15 controlled by 6A001.a.2.a; or

16 a.2.e.2. Incorporating multiplexed
17 hydrophone group signal modules having all of
18 the following characteristics:

19 a.2.e.2.a. Designed to operate at
20 depths exceeding 35 m or having an adjustable or
21 removal depth sensing device in order to operate
22 at depths exceeding 35 m; and

23 a.2.e.2.b. Capable of being
24 operationally interchanged with towed acoustic
25 hydrophone array modules;

26 a.2.f. Processing equipment, specially
27 designed for bottom or bay cable systems, having
28 “user accessible programmability” and time or
frequency domain processing and correlation,
including spectral analysis, digital filtering and
beamforming using Fast Fourier or other
transforms or processes;

b. Correlation-velocity sonar log equipment
designed to measure the horizontal speed of the
equipment carrier relative to the sea bed at
distances between the carrier and the sea bed
exceeding 500 m.

6A002 Optical sensors.

License Requirements

Reason for Control: NS, MT, CC, RS, AT, UN

Control(s)

Country Chart

NS applies to entire entry

NS Column 2

MT applies to optical detectors in 6A002.a.1, a.3, or .e that are specially designed or modified to protect “missiles” against nuclear effects (e.g., Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for “missiles”.

MT Column 1

RS applies to 6A002.a.1, a.2, a.3 (except a.3.d.2.a and a.3.e for lead selenide based focal plane arrays (FPAs)), .c, and .e

RS Column 1

CC applies to police-model infrared viewers in 6A002.c

CC Column 1

AT applies to entire entry

AT Column 1

UN applies to 6A002.a.1, a.2, a.3 and c.

Iraq, North Korea, and Rwanda.

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

LVS: \$3000; *except* N/A for MT and for 6A002.a.1, a.2, a.3, .c, and .e

GBS: N/A

CIV: N/A

List of Items Controlled

- *Unit:* Number

Related Controls: The following commodities are subject to the export licensing authority of

2 U.S. Department of State, Directorate of
 3 Defense Trade Controls (22 CFR part 121):
 4 1.) “Image intensifiers” defined in [6A002.a.2](#)
 5 and “focal plane arrays” defined in [6A002.a.3](#)
 6 specially designed, modified, or configured
 7 for military use and not part of civil
 8 equipment; 2.) “Space qualified” solid-state
 9 detectors defined in [6A002.a.1](#), “space
 10 qualified” imaging sensors (e.g.,
 11 “monospectral imaging sensors” and
 12 “multispectral imaging sensors”) defined in
 13 [6A002.b.2.b.1](#), and “space qualified”
 14 cryocoolers defined in [6A002.d.1](#), unless, on
 15 or after September 23, 2002, the Department
 16 of State issues a commodity jurisdiction
 17 determination assigning the export licensing
 18 authority to the Department of Commerce,
 19 Bureau of Industry and Security. See also
 20 [6A102](#), [6A202](#), and [6A992](#)

21 **Note:** Exporters may apply for a commodity
 22 jurisdiction request with the Department of
 23 State, Directorate of Defense Trade Controls
 24 for “space qualified” solid-state detectors
 25 defined in 6A002.a.1 and imaging sensors
 26 (e.g., “monospectral imaging sensors” and
 27 “multispectral imaging sensors”) defined in
 28 6A002.b.2.b.1 that may have predominant
 civil application(s).

29 *Related Definitions:* N/A
 30 *Items:*

31 a. Optical detectors, as follows:

32 **Note:** 6A002.a does not control germanium
 33 or silicon photodevices.

34 **N.B.:** Silicon and other material based
 35 ‘microbolometer’ non “space-qualified” “focal
 36 plane arrays” are only specified under
 37 6A002.a.3.f.

38 a.1. “Space-qualified” solid-state detectors,
 39 as follows:

40 a.1.a. “Space-qualified” solid-state
 41 detectors, having all of the following:

42 a.1.a.1. A peak response in the

wavelength range exceeding 10 nm but not
 exceeding 300 nm; *and*

a.1.a.2. A response of less than 0.1%
 relative to the peak response at a wavelength
 exceeding 400 nm;

a.1.b. “Space-qualified” solid-state
 detectors, having all of the following:

a.1.b.1. A peak response in the
 wavelength range exceeding 900 nm but not
 exceeding 1,200 nm; *and*

a.1.b.2. A response “time constant” of
 95 ns or less;

a.1.c. “Space-qualified” solid-state
 detectors having a peak response in the wavelength
 range exceeding 1,200 nm but not exceeding
 30,000 nm;

a.2. Image intensifier tubes and specially
 designed components therefor, as follows:

a.2.a. Image intensifier tubes having all of
 the following:

a.2.a.1. A peak response in the
 wavelength range exceeding 400 nm but not
 exceeding 1,050 nm;

a.2.a.2. A microchannel plate for
 electron image amplification with a hole pitch
 (center-to-center spacing) of 12 μm or less; *and*

a.2.a.3. Any of the following
 photocathodes:

a.2.a.3.a. S-20, S-25 or multialkali
 photocathodes with a luminous sensitivity
 exceeding 350 μA/lm;

a.2.a.3.b. GaAs or GaInAs
 photocathodes; *or*

a.2.a.3.c. Other III-V compound
 semiconductor photocathodes;

Note: 6A002.a.2.a.3.c does not apply to

2 *compound semiconductor photocathodes with a*
3 *maximum radiant sensitivity of 10 mA/W or less.*

4 a.2.b. Specially designed components, as
5 follows:

6 a.2.b.1. Microchannel plates having
7 a hole pitch (center-to-center spacing) of 12 μm or
8 less;

9 a.2.b.2. GaAs or GaInAs
10 photocathodes;

11 a.2.b.3. Other III-V compound
12 semiconductor photocathodes;

13 *Note:* 6A002.a.2.b.3 does not control
14 *compound semiconductor photocathodes with a*
15 *maximum radiant sensitivity of 10 mA/W or less.*

16 a.3. Non-“space-qualified” “focal plane
17 arrays”, as follows:

18 *N.B.:* Silicon and other material based
19 ‘microbolometer’ non”space-qualified” “focal
20 plane arrays” are only specified in 6A002.a.3.f.

21 **Technical Notes:**

22 1. Linear or two-dimensional multi-element
23 detector arrays are referred to as “focal plane
24 arrays”.

25 2. For the purposes of 6A002.a.3. ‘cross
26 scan direction’ is defined as the axis parallel to
27 the linear array of detector elements and the
28 ‘scan direction’ is defined as the axis
perpendicular to the linear array of detector
elements.

Note 1: 6A002.a.3 includes photoconductive
arrays and photovoltaic arrays.

Note 2: 6A002.a.3 does not control:

a. Multi-element (not to exceed 16
elements) encapsulated photoconductive cells
using either lead sulphide or lead selenide;

b. Pyroelectric detectors using any of the

following:

b.1. Triglycine sulphate and variants;

b.2. Lead-lanthanum-zirconium
titanate and variants;

b.3. Lithium tantalate;

b.4. Polyvinylidene fluoride and
variants; or

b.5. Strontium barium niobate and
variants.

a.3.a. Non-“space-qualified” “focal plane
arrays”, having all of the following:

a.3.a.1. Individual elements with a
peak response within the wavelength range
exceeding 900 nm but not exceeding 1,050 nm; and

a.3.a.2. A response “time constant” of
less than 0.5 ns;

a.3.b. Non-“space-qualified” “focal plane
arrays”, having all of the following:

a.3.b.1. Individual elements with a
peak response in the wavelength range exceeding
1,050 nm but not exceeding 1,200 nm; and

a.3.b.2. A response “time constant” of
95 ns or less;

a.3.c. Non-“space-qualified” non-linear
(2-dimensional) “focal plane arrays”, having
individual elements with a peak response in the
wavelength range exceeding 1,200 nm but not
exceeding 30,000 nm;

N.B.: Silicon and other material based
‘microbolometer’ non”space-qualified” “focal
plane arrays” are only specified in 6A002.a.3.f.

a.3.d. Non-“space-qualified” linear
(1-dimensional) “focal plane arrays”, having all of
the following:

a.3.d.1. Individual elements with a

2 peak response in the wavelength range exceeding
3 1,200 nm but not exceeding 3,000 nm; and

*microbolometer material having individual
elements with any unfiltered response between
8,000 nm and 14,000 nm.*

4 a.3.d.2. Any of the following :

b. “Monospectral imaging sensors” and
“multispectral imaging sensors” designed for
remote sensing applications, having any of the
following:

5 a.3.d.2.a. A ratio of scan
6 direction dimension of the detector element to the
cross-scan direction dimension of the detector
element of less than 3.8; *or*

b.1. An Instantaneous-Field-Of-View (IFOV)
of less than 200 μ rad (microradians); *or*

7 a.3.d.2.b. Signal processing in the
8 element (SPRITE);

b.2. Being specified for operation in the
wavelength range exceeding 400 nm but not
exceeding 30,000 nm and having all the following:

9 a.3.e. Non-“space-qualified” linear
10 (1-dimensional) “focal plane arrays”, having
individual elements with a peak response in the
wavelength range exceeding 3,000 nm but not
exceeding 30,000 nm.

b.2.a. Providing output imaging data in
digital format; *and*

11 a.3.f. Non-“space-qualified” non-linear
12 (2-dimensional) infrared “focal plane arrays”
based on ‘microbolometer’ material having
13 individual elements with an unfiltered response in
the wavelength range equal to or exceeding 8,000
14 nm but not exceeding 14,000 nm.

b.2.b. Being any of the following:

b.2.b.1. “Space-qualified”; *or*

b.2.b.2. Designed for airborne
operation, using other than silicon detectors, and
having an IFOV of less than 2.5 mrad
(milliradians).

15 **Technical Notes:**

16 1. For the purposes of 6A002.a.3.f.
17 ‘microbolometer’ is defined as a thermal imaging
18 detector that, as a result of a temperature change
in the detector caused by the absorption of
19 infrared radiation, is used to generate any usable
signal.

c. Direct view imaging equipment operating in the
visible or infrared spectrum, incorporating any of
the following:

c.1. Image intensifier tubes having the
characteristics listed in 6A002.a.2.a; *or*

c.2. “Focal plane arrays” having the
characteristics listed in 6A002.a.3.

20 2. Non- imaging thermal detectors are
not controlled by 6A002.a.3. Imaging thermal
21 detectors are a multi-element array of thermal
22 detectors with the capacity to form a visual,
electronic or other representation of an object
23 with sufficient fidelity to enable understanding of
its shape or other spatial characteristics, such as
24 height, width, or area. A multi-element array of
thermal detectors without the capacity to form
spatial representation of an object is
non-imaging.

Technical Note: “Direct view” refers to
imaging equipment, operating in the visible or
infrared spectrum, that presents a visual image to
a human observer without converting the image
into an electronic signal for television display, and
that cannot record or store the image
photographically, electronically or by any other
means.

25 3. 6A002.a.3.f captures all
26 non-“space-qualified” non-linear (2-dimensional)
infrared “focal plane arrays” based on

Note: 6A002.c does not control the following
equipment incorporating other than GaAs or
GaInAs photocathodes:

2	a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;	Control(s) NS applies to entire entry	Country Chart NS Column 2
4	b. Medical equipment;	NP applies to items controlled in paragraphs 6A003.a.2, a.3 and a.4	NP Column 1
5	c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;	RS applies to items controlled in 6A003.b.3 and b.4	RS Column 1
6	d. Flame detectors for industrial furnaces;	AT applies to entire entry	AT Column 1
7	e. Equipment specially designed for laboratory use.	UN applies to items controlled in 6A003.b.3 and b.4.	Iraq, North Korea, and Rwanda.

9 d. Special support components for optical sensors, as follows:

- 10 d.1. "Space-qualified" cryocoolers;
- 11 d.2. Non-"space-qualified" cryocoolers, having a cooling source temperature below 218 K (-55° C), as follows:

12 d.2.a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;

13 d.2.b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;

14 d.3. Optical sensing fibers specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive.

15 e. "Space qualified" "focal plane arrays" having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.

24 **6A003 Cameras.**

25 **License Requirements**

26 Reason for Control: NS, NP, RS, AT, UN

License Exceptions

- LVS: \$1500, except N/A for 6A003.a.2 through a.6, b.1, b.3 and b.4
- GBS: Yes for 6A003.a.1
- CIV: Yes for 6A003.a.1

List of Items Controlled

Unit: Number
 Related Controls: (1) See ECCNs [6E001](#) ("development"), [6E002](#) ("production"), and [6E201](#) ("use") for technology for items controlled under this entry. (2) Also see ECCN [6A203](#). (3) See ECCN 8A002.d and .e for cameras specially designed or modified for underwater use.
 Related Definitions: N/A
 Items:

a. Instrumentation cameras and specially designed components therefor, as follows:

Note: Instrumentation cameras, controlled by 6A003.a.3 to 6A003.a.5, with modular structures should be evaluated by their maximum capability, using plug-ins available according to the camera manufacturer's specifications.

a.1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously

2 advanced throughout the recording period, and
3 that are capable of recording at framing rates
4 exceeding 13,150 frames/s;

4 *Note: 6A003.a.1 does not control cinema
5 recording cameras designed for civil purposes.*

6 a.2. Mechanical high speed cameras, in which
7 the film does not move, capable of recording at
8 rates exceeding 1,000,000 frames/s for the full
9 framing height of 35 mm film, or at
10 proportionately higher rates for lesser frame
11 heights, or at proportionately lower rates for
12 greater frame heights;

13 a.3. Mechanical or electronic streak cameras
14 having writing speeds exceeding 10 mm/μs;

15 a.4. Electronic framing cameras having a
16 speed exceeding 1,000,000 frames/s;

17 a.5. Electronic cameras, having all of the
18 following:

19 a.5.a. An electronic shutter speed (gating
20 capability) of less than 1μs per full frame; *and*

21 a.5.b. A read out time allowing a framing
22 rate of more than 125 full frames per second.

23 a.6. Plug-ins, having all of the following
24 characteristics:

25 a.6.a. Specially designed for
26 instrumentation cameras which have modular
27 structures and that are controlled by 6A003.a; *and*

28 a.6.b. Enabling these cameras to meet the
characteristics specified in 6A003.a.3, 6A003.a.4
or 6A003.a.5, according to the manufacturer's
specifications.

b. Imaging cameras, as follows:

*Note: 6A003.b does not control television or
video cameras specially designed for television
broadcasting.*

b.1. Video cameras incorporating solid state
sensors, having a peak response in the wavelength

range exceeding 10 nm, but not exceeding 30,000
nm and having all of the following:

b.1.a. Having any of the following:

b.1.a.1. More than 4×10^6 “active
pixels” per solid state array for monochrome (black
and white) cameras;

b.1.a.2. More than 4×10^6 “active
pixels” per solid state array for color cameras
incorporating three solid state arrays; *or*

b.1.a.3. More than 12×10^6 “active
pixels” for solid state array color cameras
incorporating one solid state array; *and*

b.1.b. Having any of the following:

b.1.b.1. Optical mirrors controlled by
6A004.a.;

b.1.b.2. Optical control equipment
controlled by 6A004.d.; *or*

b.1.b.3. The capability for annotating
internally generated camera tracking data.

Technical Notes:

1. *For the purposes of this entry, digital
video cameras should be evaluated by the
maximum number of “active pixels” used for
capturing moving images.*

2. *For the purpose of this entry, camera
tracking data is the information necessary to define
camera line of sight orientation with respect to the
earth. This includes: 1) the horizontal angle the
camera line of sight makes with respect to the
earth's magnetic field direction and; 2) the vertical
angle between the camera line of sight and the
earth's horizon.*

b.2. Scanning cameras and scanning camera
systems, having all of the following:

b.2.a. A peak response in the wavelength
range exceeding 10 nm, but not exceeding 30,000
nm;

2 b.2.b. Linear detector arrays with more
than 8,192 elements per array; and

imaging cameras having any of the following characteristics:

3
4 b.2.c. Mechanical scanning in one
direction;

a. *A maximum frame rate equal to or less than 9 Hz;*

5 b.3. Imaging cameras incorporating image
intensifier tubes having the characteristics listed
6 in 6A002.a.2.a;

b. *Having all of the following:*

7 b.4. Imaging cameras incorporating “focal
plane arrays” having any of the following:

1. *Having a minimum horizontal or vertical Instantaneous-Field-of-View (IFOV) of at least 10 mrad/pixel (milliradians/pixel);*

8 b.4.a. Incorporating “focal plane arrays”
9 controlled by 6A002.a.3.a. to 6A002.a.3.e.; or

2. *Incorporating a fixed focal-length lens that is not designed to be removed;*

10 b.4.b. Incorporating “focal plane arrays”
11 controlled by 6A002.a.3.f.

3. *Not incorporating a direct view display, and*

12 **Note 1:** *‘Imaging cameras’ described in
13 6A003.b.4 include “focal plane arrays” combined
14 with sufficient signal processing electronics,
beyond the read out integrated circuit, to enable
as a minimum the output of an analog or digital
signal once power is supplied.*

Technical Note: *‘Direct view’ refers to an imaging camera operating in the infrared spectrum that presents a visual image to a human observer using a near-to-eye micro display incorporating any light-security mechanism.*

15 **Note 2:** *6A003.b.4.a does not control imaging
16 cameras incorporating linear “focal plane
17 arrays” with twelve elements or fewer, not
employing time-delay-and-integration within the
element, designed for any of the following:*

4. *Having any of the following:*

18 a. *Industrial or civilian intrusion alarm,
19 traffic or industrial movement control or counting
systems;*

a. *No facility to obtain a viewable image of the detected field-of-view, or*

20 b. *Industrial equipment used for
21 inspection or monitoring of heat flows in
buildings, equipment or industrial processes;*

b. *The camera is designed for a single kind of application and designed not to be user modified, or*

22 c. *Industrial equipment used for
23 inspection, sorting or analysis of the properties of
materials;*

Technical Note:

Instantaneous Field of View (IFOV) specified in Note 3.b is the lesser figure of the Horizontal FOV or the Vertical FOV.

24 d. *Equipment specially designed for
laboratory use; or*

Horizontal IFOV = horizontal Field of View (FOV)/number of horizontal detector elements

Vertical IFOV= vertical Field of View (FOV)/number of vertical detector elements.

25 e. *Medical equipment.*

c. *Where the camera is specially designed for installation into a civilian passenger land vehicle of less than three tons (gross vehicle weight) and having all of the following:*

26 **Note 3:** *6A003.b.4.b. does not control*

2 1. Is operable only when installed in
3 any of the following:

4 a. The civilian passenger land
5 vehicle for which it was intended; or

6 b. A specially designed,
7 authorized maintenance test facility; and

8 2. Incorporates an active mechanism
9 that forces the camera not to function when it is
10 removed from the vehicle for which it was
11 intended.

12 **Note:** When necessary, details of the items
13 will be provided, upon request, to the Bureau of
14 Industry and Security in order to ascertain
15 compliance with the conditions described in Note
16 3.b.4. and Note 3.c. in this Note to 6A003.b.4.b.

17 **6A004 Optics.**

18 **License Requirements**

19 Reason for Control: NS, AT

20 Control(s) Country Chart

21 NS applies to entire entry NS Column 2

22 AT applies to entire entry AT Column 1

23 **License Requirement Notes:** See §743.1 of
24 the EAR for reporting requirements for exports
25 under License Exceptions.

26 **License Exceptions**

- 27 LVS: \$3000
- 28 GBS: Yes for 6A004.a.1, a.2, a.4, b, d.2,
and d.4
- CIV: Yes for 6A004.a.1, a.2, a.4, b, d.2,
and d.4

29 **List of Items Controlled**

- 30 ● Unit: Number
- 31 ● Related Controls: 1.) For optical mirrors or
32 'aspheric optical elements' specially designed

for lithography equipment, see ECCN 3B001.
2.) "Space qualified" components for optical
systems defined in 6A004.c and optical control
equipment defined in 6A004.d.1 are subject to
the export licensing authority of the
Department of State, Directorate of Defense
Trade Controls (22 CFR part 121). 3.) See
also 6A994.

- **Related Definitions:** An 'aspheric optical
element' is any element used in an optical
system whose imaging surface or surfaces are
designed to depart from the shape of an ideal
sphere.

Items:

a. Optical mirrors (reflectors), as follows:

a.1. "Deformable mirrors" having either
continuous or multi-element surfaces, and specially
designed components therefor, capable of
dynamically repositioning portions of the surface
of the mirror at rates exceeding 100 Hz;

a.2. Lightweight monolithic mirrors having an
average "equivalent density" of less than 30 kg/m²
and a total mass exceeding 10 kg;

a.3. Lightweight "composite" or foam mirror
structures having an average "equivalent density"
of less than 30 kg/m² and a total mass exceeding 2
kg;

a.4. Beam steering mirrors more than 100 mm
in diameter or length of major axis, that maintain a
flatness of lambda/2 or better (lambda is equal to
633 nm) having a control bandwidth exceeding 100
Hz.

b. Optical components made from zinc selenide
(ZnSe) or zinc sulphide (ZnS) with transmission in
the wavelength range exceeding 3,000 nm but not
exceeding 25,000 nm and having any of the
following:

b.1. Exceeding 100 cm³ in volume; or

b.2. Exceeding 80 mm in diameter or length of
major axis and 20 mm in thickness (depth).

c. "Space-qualified" components for optical

systems, as follows:

c.1. Lightweighted to less than 20% “equivalent density” compared with a solid blank of the same aperture and thickness;

c.2. Substrates, substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;

c.3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;

c.4. Manufactured from “composite” materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction.

d. Optical control equipment, as follows:

d.1. Specially designed to maintain the surface figure or orientation of the “space-qualified” components controlled by 6A004.c.1 or 6A004.c.3;

d.2. Having steering, tracking, stabilization or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 μ rad (microradians) or less;

d.3. Gimbals having all of the following:

d.3.a. A maximum slew exceeding 5° ;

d.3.b. A bandwidth of 100 Hz or more;

d.3.c. Angular pointing errors of 200 μ rad (microradians) or less; *and*

d.3.d. Having any of the following:

d.3.d.1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 2 rad (radians)/s²; *or*

d.3.d.2. Exceeding 1 m in diameter or

major axis length and capable of angular accelerations exceeding 0.5 rad (radians)/s²;

d.4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more.

e. ‘Aspheric optical elements’ having all of the following characteristics:

e.1. The largest dimension of the optical-aperture is greater than 400 mm;

e.2. The surface roughness is less than 1 nm (rms) for sampling lengths equal to or greater than 1 mm; *and*

e.3. The coefficient of linear thermal expansion’s absolute magnitude is less than $3 \times 10^{-6}/K$ at 25° C;

Technical Notes:

1. [RESERVED]

2. *Manufacturers are not required to measure the surface roughness listed in 6A004.e.2 unless the optical element was designed or manufactured with the intent to meet, or exceed, the control parameter.*

Note: *6A004.e does not control aspheric optical elements having any of the following:*

a. A largest optical-aperture dimension less than 1 m and a focal length to aperture ratio equal to or greater than 4.5:1;

b. A largest optical-aperture dimension equal to or greater than 1 m and a focal length to aperture ratio equal to or greater than 7:1;

c. Being designed as Fresnel, flyeye, stripe, prism or diffractive optical elements;

d. Being fabricated from borosilicate glass having a coefficient of linear thermal expansion greater than $2.5 \times 10^{-6}/K$ at 25° C; or

2 e. Being an x-ray optical element having
3 inner mirror capabilities (e.g., tube-type mirrors).

applications such as cutting and welding), having
all of the following characteristics:

4 **6A005 “Lasers” (other than those described in**
5 **0B001.g.5 or .h.6), components and optical**
6 **equipment, as follows (see List of Items**
7 **Controlled).**

- (1) Operating at wavelengths between 9,000 and 11,000 nm;
- (2) A repetition rate > 250 Hz;
- (3) An average output power > 2.5kW; and
- (4) A pulse width < 200ns;

8 **License Requirements**

(d) Argon ion “lasers” controlled by 6A005.a.2
having all of the following characteristics:

Reason for Control: NS, NP, AT

Control(s) Country Chart

- (1) Operating at wavelengths between 400 and 515 nm; and
- (2) An average output power ≥ 50 W;

NS applies to entire entry NS Column 2

(e) Alexandrite “lasers” controlled by 6A005.c.2.b
having all of the following characteristics:

● NP applies to “lasers” controlled by 6A005.a.2,
b.2.b, b.3.a, b.4.b,
b.6.b., c.1.b, c.2.b, d.3.c, and
d.4.c, as described
in the following License
Requirements Note.

- (1) Operating at wavelengths between 720 and 800 nm;
- (2) A bandwidth ≤ 0.005 nm;
- (3) A repetition rate > 125 Hz; and
- (4) Average output power > 30 W;

AT applies to entire entry AT Column 1

(f) Pulse-excited, Q-switched neodymium-doped
(other than glass) “lasers” controlled by
6A005.b.6.b having all of the following
characteristics:

License Requirements Note: NP controls
apply to the following “lasers” controlled by
6A005:

- (1) An output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm;
- (2) A pulse duration equal to or more than 1 ns; and
- (3) A single-transverse mode output having an average power exceeding 40 W or a multiple-transverse mode output having an average power exceeding 50W;

(a) Pulsed excimer “lasers” controlled by
6A005.d.4.c having all of the following
characteristics:

- (1) Operating at wavelengths between 240 and 360 nm;
- (2) A repetition rate > 250 Hz; and
- (3) An average output power > 500 W;

(g) Neodymium-doped (other than glass) “lasers”
controlled by 6A005.b.2, b.3, or b.4, having all of
the following characteristics:

(b) Copper vapor “lasers” controlled by
6A005.b.4.b having all of the following
characteristics:

- (1) Operating at wavelengths between 500 and 600 nm; and
- (2) An average output power ≥ 40 W;

- (1) Incorporating frequency doubling for output wavelength between 500 and 550 nm; and
- (2) Average output power > 40 W;

(c) Pulsed carbon dioxide “lasers” controlled by
6A005.d.3.c (except industrial CO₂ lasers used in

●(h) Tunable pulsed single-mode dye laser
oscillators controlled by 6A005.c.1.b or
6A005.c.2.b having all of the following

2 characteristics:

- 3 (1) Operating at wavelengths between 300 nm and 800 nm;
- 4 (2) An average output power greater than 1 W;
- 5 (3) A repetition rate greater than 1 kHz; and
- 6 (4) Pulse width less than 100 ns;

7 •(I) Tunable pulsed dye laser amplifiers and oscillators controlled by 6A005.c.1.b or 6A005.c.2.b having all of the following characteristics:

- 9 (1) Operating at wavelengths between 300 nm and 800 nm;
- 10 (2) An average output power greater than 30 W;
- 11 (3) A repetition rate greater than 1 kHz; and
- 12 (4) Pulse width less than 100 ns;

13 *Note: NP controls do not apply to single mode oscillators.*

14 **License Exceptions**

- 15 LVS: N/A for NP items
- 16 \$3000 for all other items
- 17 • GBS: Neodymium-doped (other than glass) “lasers” controlled by 6A005.b.6.c.2 (except 6A005.b.6.c.2.b) that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm, and an average or CW output power not exceeding 2kW, and operate in a pulse-excited, non- “Q-switched” multiple-transverse mode, or in a continuously excited, multiple-transverse mode; Dye and Liquid Lasers controlled by 6A005.c.1 and c.2, except for a pulsed single longitudinal mode oscillator having an average output power exceeding 1 W and a repetition rate exceeding 1 kHz if the “pulse duration” is less than 100 ns; CO “lasers” controlled by 6A005.d.2 having a CW maximum rated single or multimode output power not

exceeding 10 kW; CO₂ or CO/CO₂ “lasers” controlled by 6A005.d.3 having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 kW; CO₂ “lasers” controlled by 6A005.d.3 that operate in CW multiple-transverse mode, and having a CW output power not exceeding 15kW; and 6A005.f.1.

• CIV: Neodymium-doped (other than glass) “lasers” controlled by 6A005.b.6.c.2 (except 6A005.b.6.c.2.b) that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm, and an average or CW output power not exceeding 2kW, and operate in a pulse-excited, non- “Q-switched” multiple-transverse mode, or in a continuously excited, multiple-transverse mode; Dye and Liquid Lasers controlled by 6A005.c.1 and c.2, except for a pulsed single longitudinal mode oscillator having an average output power exceeding 1 W and a repetition rate exceeding 1 kHz if the “pulse duration” is less than 100 ns; CO “lasers” controlled by 6A005.d.2 having a CW maximum rated single or multimode output power not exceeding 10 kW; CO₂ or CO/CO₂ “lasers” controlled by 6A005.d.3 having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 kW; CO₂ “lasers” controlled by 6A005.d.3 that operate in CW multiple-transverse mode, and having a CW output power not exceeding 15kW; and 6A005.f.1.

List of Items Controlled

- Unit: Number
- Related Controls: (1) See ECCN [6D001](#) for

“software” for items controlled under this entry. (2) See ECCNs [6E001](#) (“development”), [6E002](#) (“production”), and [6E201](#) (“use”) for technology for items controlled under this entry. (3) Also see ECCNs [6A205](#) and [6A995](#). (4) See ECCN 3B001 for excimer “lasers” specially designed for lithography equipment. (5) “Lasers” specially designed or prepared for use in isotope separation are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). (6) Shared aperture optical elements, capable of operating in “super-high power laser” applications, and “lasers” specifically designed, modified, or configured for military application are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: ‘Wall-plug efficiency’ is defined as the ratio of laser output power (or “average output power”) to total electrical input power required to operate the “laser”, including the power supply/conditioning and thermal conditioning/heat exchanger.

Items:

Notes:

1. Pulsed “lasers” include those that run in a continuous wave (CW) mode with pulses superimposed.
 2. Eximer, semiconductor, chemical, CO, CO₂, and non-repetitive pulsed Nd:glass “lasers” are only specified in 6A005.d.
 3. 6A005 includes fiber “lasers”.
 4. The control status of “lasers” incorporating frequency conversion (i.e., wavelength change) by means other than one “laser” pumping another “laser” is determined by applying the control parameters for both the output of the source “laser” and the frequency-converted optical output.
 5. 6A005 does not control the following “lasers”:
- a. Ruby with output energy below 20 J;
 - b. Nitrogen;
 - c. Krypton.

a. Non-“tunable” continuous wave “(CW) lasers”, having any of the following:

a.1. An output wavelength less than 150 nm with an output power exceeding 1W;

a.2. An output wavelength of 150 nm or more but not exceeding 520 nm and having an output power exceeding 30 W;

Note: 6A005.a.2 does not control Argon “lasers” having an output power equal to or less than 50 W.

a.3. An output wavelength exceeding 520 nm but not exceeding 540 nm and having any of the following:

a.3.a. A single transverse mode output having an output power exceeding 50 W; or

a.3.b. A multiple transverse mode output having an output power exceeding 150 W;

a.4. An output wavelength exceeding 540 nm but not exceeding 800 nm and having an output power exceeding 30 W;

a.5. An output wavelength exceeding 800 nm but not exceeding 975 nm and having any of the following:

a.5.a. A single transverse mode output having an output power exceeding 50 W; or

a.5.b. A multiple transverse mode output having an output power exceeding 80 W;

a.6. An output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:

a.6.a. A single transverse mode output having any of the following:

a.6.a.1. A “wall-plug efficiency” exceeding 12% and an output power exceeding 100 W; or

a.6.a.2. An output power exceeding

150 W; *or*

a.6.b. A multiple transverse mode output having any of the following:

a.6.b.1. A “wall-plug efficiency” exceeding 18% and an output power exceeding 500 W; *or*

a.6.b.2. An output power exceeding 2 kW;

Note: 6A005.a.6.b does not control multiple transverse mode, industrial “lasers” with output power exceeding 2kW and not exceeding 6 kW with a total mass greater than 1,200 kg. For the purpose of this note, total mass includes all components required to operate the “laser”, e.g., “laser”, power supply, heat exchanger, but excludes external optics for beam conditioning and/or delivery.

a.7. An output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and having any of the following:

a.7.a. A single transverse mode having an output power exceeding 50 W; *or*

a.7.b. A multiple transverse mode having an output power exceeding 80 W; *or*

a.8. An output wavelength exceeding 1,555 nm and having an output power exceeding 1 W.

b. Non-“tunable” “pulsed lasers”, having any of the following:

b.1. An output wavelength less than 150 nm and having any of the following:

b.1.a. An output energy exceeding 50 mJ per pulse and a “peak power” exceeding 1 W; *or*

b.1.b. An “average output power” exceeding 1 W;

b.2. An output wavelength of 150 nm or more but not exceeding 520 nm and having any of the following:

b.2.a. An output energy exceeding 1.5 J per pulse and a “peak power” exceeding 30 W; *or*

b.2.b. An “average output power” exceeding 30 W;

Note: 6A005.b.2.b does not control Argon “lasers” having an “average output power” equal to or less than 50 W.

b.3. An output wavelength exceeding 520 nm, but not exceeding 540 nm and having any of the following:

b.3.a. A single transverse mode output having any of the following:

b.3.a.1. An output energy exceeding 1.5 J per pulse and a “peak power” exceeding 50 W; *or*

b.3.a.2. An “average output power” exceeding 50 W; *or*

b.3.b. A multiple transverse mode output having any of the following:

b.3.b.1. An output energy exceeding 1.5 J per pulse and a “peak power” exceeding 150 W; *or*

b.3.b.2. An “average output power” exceeding 150 W;

b.4. An output wavelength exceeding 540 nm but not exceeding 800 nm and having any of the following:

b.4.a. An output energy exceeding 1.5 J per pulse and a “peak power” exceeding 30 W; *or*

b.4.b. An “average output power” exceeding 30 W;

b.5. An output wavelength exceeding 800 nm but not exceeding 975 nm and having any of

2 the following:

3 b.5.a. A “pulse duration” not exceeding
4 1 μs and having any of the following:

5 b.5.a.1. An output energy exceeding
6 0.5 J per pulse and a “peak power” exceeding 50
7 W;

8 b.5.a.2. A single transverse mode
9 output having an “average output power”
10 exceeding 20 W; *or*

11 b.5.a.3. A multiple transverse mode
12 output having an “average output power”
13 exceeding 50 W; *or*

14 b.5.b. A “pulse duration” exceeding 1
15 μs and having any of the following:

16 b.5.b.1. An output energy exceeding
17 2 J per pulse and a “peak power” exceeding 50 W;

18 b.5.b.2. A single transverse mode
19 output having an “average output power”
20 exceeding 50 W; *or*

21 b.5.b.3. A multiple transverse mode
22 output having an “average output power”
23 exceeding 80 W.

24 b.6. An output wavelength exceeding 975
25 nm but not exceeding 1,150 nm and having any of
26 the following:

27 b.6.a. A “pulse duration” of less than 1
28 μs and having any of the following:

b.6.a.1. An output “peak power”
exceeding 5 GW per pulse;

b.6.a.2. An “average output power”
exceeding 10 W; *or*

b.6.a.3. An output energy exceeding
0.1 J per pulse;

b.6.b. A “pulse duration” exceeding 1 ns
but not exceeding 1 μs, and having any of the
following:

b.6.b.1. A single transverse mode
output having any of the following:

b.6.b.1.a. A “peak power”
exceeding 100 MW;

b.6.b.1.b. An “average output
power” exceeding 20 W limited by design to a
maximum pulse repetition frequency less than or
equal to 1 kHz;

b.6.b.1.c. A ‘wall-plug
efficiency’ exceeding 12% and an “average output
power” exceeding 100 W and capable of operating
at a pulse repetition frequency greater than 1 kHz;

b.6.b.1.d. An “average output
power” exceeding 150 W and capable of operating
at a pulse repetition frequency greater than 1 kHz;
or

b.6.b.1.e. An output energy
exceeding 2 J per pulse;

b.6.b.2. A multiple transverse mode
output having any of the following:

b.6.b.2.a. A “peak power”
exceeding 400 MW;

b.6.b.2.b. A ‘wall-plug
efficiency’ exceeding 18% and an “average output
power” exceeding 500 W;

b.6.b.2.c. An “average output
power” exceeding 2 kW; *or*

b.6.b.2.d. An output energy
exceeding 4 J per pulse; *or*

b.6.c. A “pulse duration” exceeding 1 μs
and having any of the following:

b.6.c.1. A single transverse mode
output having any of the following:

b.6.c.1.a. A “peak power”
exceeding 500 kW;

b.6.c.1.b. A ‘wall-plug efficiency’ exceeding 12% and an “average output power” exceeding 100 W; *or*

b.6.c.1.c. An “average output power” exceeding 150 W; *or*

b.6.c.2. A multiple transverse mode output having any of the following:

b.6.c.2.a. A “peak power” exceeding 1 MW;

b.6.c.2.b. A ‘wall-plug efficiency’ exceeding 18% and an “average output power” exceeding 500 W; *or*

b.6.c.2.c. An “average output power” exceeding 2 kW;

b.7. An output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and having any of the following:

b.7.a. A “pulse duration” not exceeding 1 μ s and having any of the following:

b.7.a.1. An output energy exceeding 0.5 J per pulse and a “peak power” exceeding 50 W;

b.7.a.2. A single transverse mode output having an “average output power” exceeding 20 W; *or*

b.7.a.3. A multiple transverse mode output having an “average output power” exceeding 50 W; *or*

b.7.b. A “pulse duration” exceeding 1 μ s and having any of the following:

b.7.b.1. An output energy exceeding 2 J per pulse and a “peak power” exceeding 50 W;

b.7.b.2. A single transverse mode output having an “average output power” exceeding 50 W; *or*

b.7.b.3. A multiple transverse mode

output having an “average output power” exceeding 80 W; *or*

b.8. An output wavelength exceeding 1,555 nm and having any of the following:

b.8.a. An output energy exceeding 100 mJ per pulse and a “peak power” exceeding 1 W; *or*

b.8.b. An “average output power” exceeding 1 W;

c. “Tunable” lasers, having any of the following:

Note: 6A005.c includes titanium-sapphire (Ti:Al₂O₃), thulium-YAG (Tm:YAG), thulium-YSGG (Tm:YSGG), alexandrite (Cr:BeAl₂O₄), color center “lasers”, dye “lasers”, and liquid “lasers”.

c.1. An output wavelength less than 600 nm and having any of the following:

c.1.a. An output energy exceeding 50 mJ per pulse and a “peak power” exceeding 1 W; *or*

c.1.b. An average or CW output power exceeding 1W;

c.2. An output wavelength of 600 nm or more but not exceeding 1,400 nm and having any of the following:

c.2.a. An output energy exceeding 1 J per pulse and a “peak power” exceeding 20 W; *or*

c.2.b. An average or CW output power exceeding 20 W; *or*

c.3. An output wavelength exceeding 1,400 nm and having any of the following:

c.3.a. An output energy exceeding 50 mJ per pulse and a “peak power” exceeding 1 W; *or*

c.3.b. An average or CW output power exceeding 1 W;

d. Other “lasers”, not controlled in 6A005.a., 6A005.b, or 6A005.c, as follows:

d.1. Semiconductor “lasers”, as follows: 25 W; *or*

Notes:

1. 6A005.d.1 includes semiconductor “lasers” having optical output connectors (e.g., fiber optic pigtails).

2. The control status of semiconductor “lasers” specially designed for other equipment is determined by the control status of the other equipment.

d.1.a. Individual single-transverse mode semiconductor “lasers”, having any of the following:

d.1.a.1. A wavelength equal to or less than 1,510 nm and having an average or CW output power exceeding 1.5 W; *or*

d.1.a.2. A wavelength greater than 1,510 nm, and having an average or CW output power exceeding 500 mW;

d.1.b. Individual, multiple-transverse mode semiconductor “lasers”, having any of the following:

d.1.b.1. A wavelength of less than 1,400 nm and having an average or CW output power exceeding 10W;

d.1.b.2. A wavelength equal to or greater than 1,400 nm and less than 1,900 nm, and having an average or CW output power exceeding 2.5 W; *or*

d.1.b.3. A wavelength equal to or greater than 1,900 nm and having an average or CW output power exceeding 1 W.

d.1.c. Individual semiconductor “laser” arrays, having any of the following:

d.1.c.1. A wavelength of less than 1,400 nm and having an average or CW output power exceeding 80 W;

d.1.c.2. A wavelength equal to or greater than 1,400 nm and less than 1,900 nm and having an average or CW output power exceeding

d.1.c.3. A wavelength equal to or greater than 1,900 nm and having an average or CW output power exceeding 10 W.

d.1.d. Array stacks of semiconductor “lasers” containing at least one array that is controlled under 6A005.d.1.c.

Technical Notes:

1. Semiconductor “lasers” are commonly called “laser” diodes.

2. An “array” consists of multiple semiconductor “laser” emitters fabricated as a single chip so that the centers of the emitted light beams are on parallel paths.

3. An “array stack” is fabricated by stacking, or otherwise assembling, “arrays” so that the centers of the emitted light beams are on parallel paths.

d.2. Carbon monoxide (CO) “lasers” having any of the following:

d.2.a. An output energy exceeding 2 J per pulse and a “peak power” exceeding 5 kW; *or*

d.2.b. An average or CW output power exceeding 5 kW;

d.3. Carbon dioxide (CO₂) “lasers” having any of the following:

d.3.a. A CW output power exceeding 15 kW;

d.3.b. A pulsed output having a “pulse duration” exceeding 10 μs and having any of the following:

d.3.b.1. An “average output power” exceeding 10 kW; *or*

d.3.b.2. A “peak power” exceeding 100 kW; *or*

d.3.c. A pulsed output having a “pulse duration” equal to or less than 10 μs and having any of the following:

d.3.c.1. A pulse energy exceeding 5 J per pulse; *or*

d.3.c.2. An “average output power” exceeding 2.5 kW;

d.4. Excimer “lasers”, having any of the following:

d.4.a. An output wavelength not exceeding 150 nm and having any of the following:

d.4.a.1. An output energy exceeding 50 mJ per pulse; *or*

d.4.a.2. An “average output power” exceeding 1 W;

d.4.b. An output wavelength exceeding 150 nm but not exceeding 190 nm and having any of the following:

d.4.b.1. An output energy exceeding 1.5 J per pulse; *or*

d.4.b.2. An “average output power” exceeding 120 W;

d.4.c. An output wavelength exceeding 190 nm but not exceeding 360 nm and having any of the following:

d.4.c.1. An output energy exceeding 10 J per pulse; *or*

d.4.c.2. An “average output power” exceeding 500 W; *or*

d.4.d. An output wavelength exceeding 360 nm and having any of the following:

d.4.d.1. An output energy exceeding 1.5 J per pulse; *or*

d.4.d.2. An “average output power” exceeding 30 W;

Note: For excimer “lasers” specially designed for lithography equipment, see 3B001.

d.5. “Chemical lasers”, as follows:

d.5.a. Hydrogen Fluoride (HF) “lasers”;

d.5.b. Deuterium Fluoride (DF) “lasers”;

d.5.c. “Transfer lasers”, as follows:

d.5.c.1. Oxygen Iodine (O₂-I) “lasers”;

d.5.c.2. Deuterium Fluoride-Carbon dioxide (DF-CO₂) “lasers”;

d.6. “Non-repetitive pulsed” Neodymium (Nd) glass “lasers”, having any of the following:

d.6.a. A “pulse duration” not exceeding 1 μs and an output energy exceeding 50 J per pulse; *or*

d.6.b. A “pulse duration” exceeding 1 μs and an output energy exceeding 100 J per pulse;

Note: “Non-repetitive pulsed” refers to “lasers” that produce either a single output pulse or that have a time interval between pulses exceeding one minute.

e. Components, as follows:

e.1. Mirrors cooled either by active cooling or by heat pipe cooling;

Technical Note: Active cooling is a cooling technique for optical components using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.

e.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with controlled “lasers”;

f. Optical equipment, as follows:

N.B.: For shared aperture optical elements, capable of operating in “Super-High Power

2 Laser” (“SHPL”) applications, see the U.S.
3 Munitions List (22 CFR part 121).

4 f.1. Dynamic wavefront (phase) measuring
5 equipment capable of mapping at least 50
6 positions on a beam wavefront having any the
7 following:

8 f.1.a. Frame rates equal to or more than
9 100 Hz and phase discrimination of at least 5% of
10 the beam's wavelength; or

11 f.1.b. Frame rates equal to or more than
12 1,000 Hz and phase discrimination of at least 20%
13 of the beam's wavelength;

14 f.2. “Laser” diagnostic equipment capable of
15 measuring “SHPL” system angular beam steering
16 errors of equal to or less than 10 µrad;

17 f.3. Optical equipment and components
18 specially designed for a phased-array “SHPL”
19 system for coherent beam combination to an
20 accuracy of lambda/10 at the designed
21 wavelength, or 0.1 µm, whichever is the smaller;

22 f.4. Projection telescopes specially designed
23 for use with “SHPL” systems.

24 **6A006 “Magnetometers”, “magnetic
25 gradiometers”, “intrinsic magnetic
26 gradiometers”, underwater electric field
27 sensors, and “compensation systems”, and
28 specially designed components therefor, as
follows (see List of Items Controlled).**

License Requirements

Reason for Control: NS, AT

Control(s) Country Chart

NS applies to entire entry NS Column 2

AT applies to entire entry AT Column 1

License Requirement Notes: See §743.1 of
the EAR for reporting requirements for exports
under License Exceptions.

License Exceptions

LVS: \$1500, N/A for 6A006.a.1;
“Magnetometers” and subsystems
defined in 6A006.a.2 using optically
pumped or nuclear precession
(proton/Overhauser) having a “noise
level” (sensitivity) lower (better) than
2 pT rms per square root Hz; and
6A006.d.

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: See also 6A996. This entry
does not control instruments specially designed
for fishery applications or biomagnetic
measurements for medical diagnostics.

Related Definitions: N/A

Items:

a. “Magnetometers” and subsystems, as follows:

a.1. Using “superconductive” (SQUID)
“technology” and having any of the following
characteristics:

a.1.a. SQUID systems designed for
stationary operation, without specially designed
subsystems designed to reduce in-motion noise,
and having a “noise level” (sensitivity) equal to or
lower (better) than 50 fT (rms) per square root Hz
at a frequency of 1 Hz; or

a.1.b. SQUID systems having an
in-motion-magnetometer “noise level” (sensitivity)
lower (better) than 20 pT (rms) per square root Hz
at a frequency of 1 Hz and specially designed to
reduce in-motion noise;

a.2. Using optically pumped or nuclear
precession (proton/Overhauser) “technology”
having a “noise level” (sensitivity) lower (better)
than 20 pT (rms) per square root Hz;

a.3. Using fluxgate “technology” having a
“noise level” (sensitivity) equal to or lower (better)
than 10 pT (rms) per square root Hz at a frequency

2 of 1 Hz;

3 a.4. Induction coil “magnetometers” having
4 a “noise level” (sensitivity) lower (better) than
any of the following:

5 a.4.a. 0.05 nT rms/square root Hz at
6 frequencies of less than 1 Hz;

7 a.4.b. 1×10^{-3} nT rms/square root Hz at
8 frequencies of 1 Hz or more but not exceeding 10
9 Hz; *or*

10 a.4.c. 1×10^{-4} nT rms/square root Hz at
11 frequencies exceeding 10 Hz;

12 a.5. Fiber optic “magnetometers” having a
13 “noise level” (sensitivity) lower (better) than 1 nT
14 rms per square root Hz;

15 b. Underwater electric field sensors having a
16 “noise level” (sensitivity) lower (better) than 8
17 nanovolt per meter per square root Hz when
18 measured at 1 Hz.

19 c. “Magnetic gradiometers” as follows:

20 c.1. “Magnetic gradiometers” using multiple
21 “magnetometers” controlled by 6A006.a;

22 c.2. Fiber optic “intrinsic magnetic
23 gradiometers” having a magnetic gradient field
24 “noise level” (sensitivity) lower (better) than 0.3
25 nT/m rms per square root Hz;

26 c.3. “Intrinsic magnetic gradiometers”, using
27 “technology” other than fiber-optic “technology”,
28 having a magnetic gradient field “noise level”
(sensitivity) lower (better) than 0.015 nT/m rms
per square root Hz; *and*

d. “Compensation systems” for magnetic and
Underwater Electric Field Sensors resulting in a
performance equal to or better than the control
parameters of 6A006.a, 6A006.b, and 6A006.c.

**6A007 Gravity meters (gravimeters) and
gravity gradiometers, as follows (see List of
Items Controlled).**

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 2

MT applies to 6A007.b and .c MT Column 1
when the accuracies in
6A007.b.1 and b.2 are met
or exceeded

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$3000; N/A for MT

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: See also [6A107](#) and [6A997](#)

Related Definitions: N/A

Items:

a. Gravity meters designed or modified for ground
use having a static accuracy of less (better) than 10
µgal;

Note: 6A007.a does not control ground
gravity meters of the quartz element (Worden) type.

b. Gravity meters designed for mobile platforms
for ground, marine, submersible, space or airborne
use, having all of the following:

b.1. A static accuracy of less (better) than 0.7
mgal; *and*

b.2. An in-service (operational) accuracy of
less (better) than 0.7 mgal having a
time-to-steady-state registration of less than 2
minutes under any combination of attendant
corrective compensations and motional influences;

c. Gravity gradiometers.

2
3
4 **6A008 Radar systems, equipment and assemblies having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.**

5
6 **License Requirements**

7 Reason for Control: NS, MT, RS, AT

8 Control(s) Country Chart

9 NS applies to entire entry NS Column 2

10 MT applies to items that are designed for airborne applications and that are usable in systems controlled for MT reasons MT Column 1

11 RS applies to 6A008.j.1 RS Column 1

12 AT applies to entire entry AT Column 1

13 **License Requirement Notes:** See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

14 **License Exceptions**

15 LVS: \$5000; N/A for MT and for 6A008.j.1 and 6A008.l.3

16 GBS: Yes, for 6A008.b, .c, and l.1 only

17 CIV: Yes, for 6A008.b, .c, and l.1 only

18 **List of Items Controlled**

19 Unit: \$ value

20 Related Controls: This entry does not control: Secondary surveillance radar (SSR); Car radar designed for collision prevention; Displays or monitors used for Air Traffic Control (ATC) having no more than 12 resolvable elements per mm; Meteorological (weather) radar. See also [6A108](#) and [6A998](#). ECCN [6A998](#) controls, *inter alia*, the LIDAR

equipment excluded by the note to paragraph j of this ECCN ([6A008](#)).

Related Definitions: N/A

Items:

Note: 6A008 does not control:

- a. Secondary surveillance radar (SSR);
- b. Civil Automotive Radar;
- c. Displays or monitors used for air traffic control (ATC) having no more than 12 resolvable elements per mm;
- d. Meteorological (weather) radar.

a. Operating at frequencies from 40 GHz to 230 GHz and having any of the following:

- a.1. An “average output power” exceeding 100 mW; or
- a.2. Locating accuracy of 1 m or less (better) in range and 0.2 degree or less (better) in azimuth;

b. Having a tunable bandwidth exceeding ±6.25% of the center operating frequency;

Technical Note: The center operating frequency equals one half of the sum of the highest plus the lowest specified operating frequencies.

- c. Capable of operating simultaneously on more than two carrier frequencies;
- d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;
- e. Incorporating “electronically steerable phased array antennae”;
- f. Capable of heightfinding non-cooperative targets;

Note: 6A008.f does not control precision approach radar (PAR) equipment conforming to ICAO standards.

g. Specially designed for airborne (balloon or airframe mounted) operation and having Doppler “signal processing” for the detection of moving

2 targets;

k. Having “signal processing” sub-systems using “pulse compression”, with any of the following:

3 h. Employing processing of radar signals using any of the following:

k.1. A “pulse compression” ratio exceeding 150; *or*

4 h.1. “Radar spread spectrum” techniques; *or*

k.2. A pulse width of less than 200 ns; *or*

5 h.2. “Radar frequency agility” techniques;

l. Having data processing sub-systems with any of the following:

6 I. Providing ground-based operation with a maximum “instrumented range” exceeding 185 km;

l.1. “Automatic target tracking” providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage;

7 *Note: 6A008.I does not control:*

Note: 6A008.l.1 does not control conflict alert capability in ATC systems, or marine or harbor radar.

8 a. Fishing ground surveillance radar;

9 b. Ground radar equipment specially designed for en route air traffic control, provided that all the following conditions are met:

l.2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates;

10 1. It has a maximum “instrumented range” of 500 km or less;

l.3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; *or*

11 2. It is configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centers;

l.4. Superposition and correlation, or fusion, of target data from two or more “geographically dispersed” and “interconnected radar sensors” to enhance and discriminate targets.

12 3. It contains no provisions for remote control of the radar scan rate from the en route ATC center; and

13 4. It is to be permanently installed;

Note: 6A008.l.4 does not control systems, equipment and assemblies designed for marine traffic control.

14 c. Weather balloon tracking radars.

15 j. Being “laser” radar or Light Detection and Ranging (LIDAR) equipment, having any of the following:

6A102 Radiation hardened detectors, other than those controlled by 6A002, specially designed or modified for protecting against nuclear effects (e.g., Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects) and usable for “missiles”, designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5 x 10⁵ rads (silicon).

16 j.1. “Space-qualified”; *or*

17 j.2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 μrad (microradians);

18 *Note: 6A008.j does not control LIDAR equipment specially designed for surveying or for meteorological observation.*

License Requirements

Reason for Control: MT, AT

2 *Control(s)* *Country Chart*

(see List of Items Controlled).

3 MT applies to entire entry MT Column 1

License Requirements

4 AT applies to entire entry AT Column 1

Reason for Control: MT, AT

5 *Control(s)* *Country Chart*

License Exceptions

6 MT applies to entire entry MT Column 1

7 LVS: N/A
GBS: N/A
CIV: N/A

AT applies to entire entry AT Column 1

License Exceptions

8 **List of Items Controlled**

9 *Unit:* Components in number

10 *Related Controls:* N/A

11 *Related Definitions:* In this entry, a detector

12 is defined as a mechanical, electrical, optical

13 or chemical device that automatically

14 identifies and records, or registers a stimulus

15 such as an environmental change in pressure

16 or temperature, an electrical or

17 electromagnetic signal or radiation from a

18 radioactive material.

19 *Items:*

20 The list of items controlled is contained in the

21 ECCN heading.

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6A103 Radomes designed to withstand a

combined thermal shock greater than 100

cal/sq cm accompanied by a peak over pressure

of greater than 50 kPa, usable in protecting

“missiles” against nuclear effects (e.g.

Electromagnetic Pulse (EMP), X-rays,

combined blast and thermal effects), and

usable for “missiles”. (These items are subject

to the export licensing authority of the U.S.

Department of State, Directorate of Defense

Trade Controls. See 22 CFR part 121.)

6A107 Gravity meters (gravimeters) and

specially designed components for gravity

meters and gravity gradiometers, as follows

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

a. Gravity meters (gravimeters), other than those controlled by 6A007.b, designed or modified for airborne or marine use, and having a static or operational accuracy of 7×10^{-6} m/s² (0.7 milligal) or better, and having a time to steady-state registration of two minutes or less, usable for “missiles”;

b. Specially designed components for gravity meters controlled in 6A007.b or 6A107.a and gravity gradiometers controlled in 6A007.c.

6A108 Radar systems and tracking systems, other than those controlled by 6A008, as follows (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

Control(s) *Country Chart*

MT applies to entire entry MT Column 1

2 AT applies to entire entry AT Column 1

translator installed on the rocket or unmanned aerial vehicle in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;

3 License Exceptions

4 LVS: N/A
5 GBS: N/A
6 CIV: N/A

b.2. Range instrumentation radars including associated optical/infrared trackers with all of the following capabilities:

6 List of Items Controlled

7 Unit: \$ value
8 Related Controls: 1.) This entry does not control airborne civil weather radar conforming to international standards for civil weather radars provided that they do not incorporate any of the following: (a) Phased array antennas; (b) Frequency agility; (c) Spread spectrum; or (d) Signal processing specially designed for the tracking of vehicles. 2.) Items in [6A108.a](#) that are specially designed or modified for “missiles” or for items on the U.S. Munitions List are subject to the export licensing authority of the U.S. Department of State, Defense Trade Controls (see 22 CFR part 121).

b.2.a. Angular resolution better than 3 milliradians;
b.2.b. Range of 30 km or greater with a range resolution better than 10 m rms;
b.2.c. Velocity resolution better than 3 m/s.

10 Related Definitions: Laser radar systems are defined as those that embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.

6A202 Photomultiplier tubes having both of the following characteristics (see List of Items Controlled).

14 Items:

License Requirements

15 a. Radar and laser radar systems designed or modified for use in “missiles”;

Reason for Control: NP, AT
Control(s) Country Chart
NP applies to entire entry NP Column 1
AT applies to entire entry AT Column 1

16 Note: 6A108.a includes the following:
17 a. Terrain contour mapping equipment;
18 b. Imaging sensor equipment;
19 c. Scene mapping and correlation (both digital and analog) equipment;
20 d. Doppler navigation radar equipment.

License Exceptions

21 b. Precision tracking systems, usable for rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km, as follows:

LVS: N/A
GBS: N/A
CIV: N/A

22 b.1. Tracking systems which use a code

List of Items Controlled

Unit: Number
Related Controls: See ECCNs [6E001](#) (“development”), [6E002](#) (“production”), and [6E201](#) (“use”) for technology for items controlled under this entry.
Related Definitions: N/A

2 *Items:*

- 3 a. Photocathode area of greater than 20 cm²; and
- 4 b. Anode pulse rise time of less than 1 ns.

6A203.a include their synchronizing electronics units and rotor assemblies consisting of turbines, mirrors and bearings.

b. Electronic streak cameras, electronic framing cameras, tubes and devices, as follows:

5 **6A203 Cameras and components, other than**
6 **those controlled by 6A003, as follows (see List**
7 **of Items Controlled).**

b.1. Electronic streak cameras capable of 50 ns or less time resolution;

b.2. Streak tubes for cameras controlled by 6A203.b.1;

8 **License Requirements**

9 *Reason for Control:* NP, AT

b.3. Electronic (or electronically shuttered) framing cameras capable of 50 ns or less frame exposure time;

10 *Control(s)* Country Chart

11 NP applies to entire entry NP Column 1

b.4. Framing tubes and solid-state imaging devices for use with cameras controlled by 6A203.b.3, as follows:

12 AT applies to entire entry AT Column 1

13 **License Exceptions**

14 LVS: N/A
15 GBS: N/A
16 CIV: N/A

b.4.a. Proximity focused image intensifier tubes having the photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;

17 **List of Items Controlled**

18 *Unit:* Equipment and components in number; parts and accessories in \$ value

b.4.b. Gated silicon intensifier target (SIT) videcon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;

19 *Related Controls:* (1) See ECCNs [6E001](#) (“development”), [6E002](#) (“production”), and [6E201](#) (“use”) for technology for items controlled under this entry. (2) Also see ECCN [6A003.a.2](#), [a.3](#), and [a.4](#).

b.4.c. Kerr or Pockels cell electro-optical shuttering;

20 *Related Definitions:* N/A

b.4.d. Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras controlled by 6A203.b.3.

21 *Items:*

22 a. Mechanical rotating mirror cameras, as follows, and specially designed components therefor:

c. Radiation-hardened TV cameras, or lenses therefor, specially designed or rated as radiation hardened to withstand a total radiation dose greater than 50 x 10³ Gy (silicon) (5 x 10⁶ rad (silicon)) without operational degradation.

23 a.1. Framing cameras with recording rates greater than 225,000 frames per second;

24 a.2. Streak cameras with writing speeds greater than 0.5 mm per microsecond;

Technical Note: *The term Gy (silicon) refers to the energy in Joules per kilogram absorbed by an unshielded silicon sample when exposed to ionizing radiation.*

25 *Note:* Components of cameras controlled by

2 **6A205 “Lasers”, “laser” amplifiers and**
3 **oscillators, other than those controlled by**
4 **0B001.g.5, 0B001.h.6, or 6A005, as follows (see**
5 **List of Items Controlled).**

oscillators having all of the following characteristics:

6 **License Requirements**

7 *Reason for Control:* NP, AT

b.1. Operating at wavelengths between 600 nm and 800 nm;

b.2. Having an average output greater than 1 W;

b.3 A repetition rate greater than 1 kHz; *and*

b.4. Pulse width less than 100 ns;

8 *Control(s)*

Country Chart

9 NP applies to entire entry

NP Column 1

c. [RESERVED]

10 AT applies to entire entry

AT Column 1

d. Pulsed carbon dioxide “lasers” having all of the following characteristics:

11 **License Exceptions**

LVS: N/A

12 GBS: N/A

CIV: N/A

d.1. Operating at wavelengths between 9,000 nm and 11,000 nm;

d.2. A repetition rate greater than 250 Hz;

d.3. An average output power greater than 500 W; *and*

d.4. Pulse width of less than 200 ns;

13 **List of Items Controlled**

Unit: Equipment in number

14 *Related Controls:* (1) See ECCNs [6E001](#)
15 (“development”), [6E002](#) (“production”), and
16 [6E201](#) (“use”) for technology for items
17 controlled under this entry. (2) Also see
18 ECCNs [6A005](#) and [6A995](#). (3) See ECCN
19 [6A005.a.2](#) for additional controls on argon
20 ion lasers; See ECCN [6A005.b.6.b](#) for
21 additional controls on neodymium-doped
22 lasers. (4) “Lasers” specially designed or
23 prepared for use in isotope separation are
24 subject to the export licensing authority of the
25 Nuclear Regulatory Commission (see 10 CFR
26 part 110).

Related Definitions: N/A

Items:

e. Para-hydrogen Raman shifters designed to operate at 16 micrometer output wavelength and at a repetition rate greater than 250 Hz.;

f. Neodymium-doped (other than glass) lasers with an output wavelength between 1000 and 1100 nm having either of the following:

f.1. Pulse-excited and Q-switched with a pulse duration equal to or greater than 1 ns, and having either of the following:

f.1.a. A single-transverse mode output with an average output power greater than 40 W; or

f.1.b. A multiple-transverse mode output with an average output power greater than 50 W; *or*

f.2. Incorporating frequency doubling to give an output wavelength between 500 and 550 nm with an average output power of greater than 40 W.

27 a. Argon ion “lasers” having both of the following characteristics:

28 a.1. Operating at wavelengths between 400 nm and 515 nm; *and*

a.2. An average output power greater than 40 W;

b. Tunable pulsed single-mode dye laser

6A225 Velocity interferometers for measuring

2 velocities exceeding 1 km/s during time
intervals of less than 10 microseconds.

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

3 License Requirements

4 Reason for Control: NP, AT

List of Items Controlled

5 Control(s) Country Chart

6 NP applies to entire entry NP Column 1

7 AT applies to entire entry AT Column 1

Unit: Equipment in number; parts and accessories in \$ value

Related Controls: See ECCNs [6E001](#) (“development”), [6E002](#) (“production”), and [6E201](#) (“use”) for technology for items controlled under this entry.

Related Definitions: N/A

Items:

8 License Exceptions

9 LVS: N/A
10 GBS: N/A
11 CIV: N/A

a. Manganin gauges for pressures greater than 100 kilobars; or

b. Quartz pressure transducers for pressures greater than 100 kilobars.

List of Items Controlled

12 Unit: Equipment in number; parts and accessories in \$ value

13 Related Controls: See ECCNs [6E001](#) (“development”), [6E002](#) (“production”), and [6E201](#) (“use”) for technology for items controlled under this entry.

14 Related Definitions: N/A

15 ECCN Controls: 6A225 includes velocity interferometers, such as VISARs (Velocity interferometer systems for any reflector) and DLIs (Doppler laser interferometers).

16 Items:

6A991 Marine or terrestrial acoustic equipment, n.e.s., capable of detecting or locating underwater objects or features or positioning surface vessels or underwater vehicles; and specially designed components, n.e.s.

17 The list of items controlled is contained in the ECCN heading.

License Requirements

Reason for Control: AT

18

19 6A226 Pressure sensors, as follows (see List of Items Controlled).

Control(s) Country Chart

AT applies to entire entry AT Column 2

20 License Requirements

21 Reason for Control: NP, AT

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

22 Control(s) Country Chart

23 NP applies to entire entry NP Column 1

24 AT applies to entire entry AT Column 1

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

2 The list of items controlled is contained in the
3 ECCN heading.

micrometers; *and*

a.1.c. Having any of the following:

4 **6A992 Optical Sensors, not controlled by
5 6A002.**

a.1.c.1. An S-20, S-25 or multialkali
photocathode; *or*

6 **License Requirements**

a.1.c.2. A GaAs or GaInAs
photocathode;

7 *Reason for Control:* AT, RS

a.2. Specially designed microchannel plates
having both of the following characteristics:

8 *Control(s)* *Country Chart*

9 AT applies to entire entry *AT Column 1*

a.2.a. 15,000 or more hollow tubes per
plate; *and*

10 RS applies to entire entry. A license is required
11 for items controlled by this entry for export or
12 reexport to Iraq or transfer within Iraq for regional
13 stability reasons. The Commerce Country Chart
is not designed to determine RS license
requirements for this entry. See §§742.6 and
746.3 of the EAR for additional information.

a.2.b. Hole pitch (center-to-center spacing)
of less than 25 micrometers.

b. Direct view imaging equipment operating in the
visible or infrared spectrum, incorporating image
intensifier tubes having the characteristics listed in
6A992.a.1.

14 **License Exceptions**

15 LVS: N/A
16 GBS: N/A
CIV: N/A

**6A993 Cameras, not controlled by 6A003 or
6A203, as follows (see List of Items Controlled).**

License Requirements

17 **List of Items Controlled**

18 *Unit:* Equipment in number; parts and
accessories in \$ value
19 *Related Controls:* N/A
Related Definitions: N/A
20 *Items:*

Reason for Control: AT

Controls *Country Chart*

AT applies to entire entry *AT Column 1*

License Exceptions

21 a. Image intensifier tubes and specially designed
components therefor, as follows:

LVS: N/A
GBS: N/A
CIV: N/A

22 a.1. Image intensifier tubes having all the
following:

List of Items Controlled

23 a.1.a. A peak response in wavelength
24 range exceeding 400 nm, but not exceeding 1,050
25 nm;

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

26 a.1.b. A microchannel plate for electron
27 image amplification with a hole pitch
(center-to-center spacing) of less than 25

a. Cameras that meet the criteria of Note 3 to

2 6A003.b.4.

500 nm or more;

3 b. [RESERVED]

a.2.b. Instantaneous optical bandpass of 1.25 nm or less;

4 **6A994 Optics, not controlled by 6A004.**

a.2.c. Wavelength resettable within 0.1 ms to an accuracy of 1 nm or better within the tunable spectral range; *and*

5 **License Requirements**

6 *Reason for Control:* AT

a.2.d. A single peak transmission of 91% or more;

7 *Control(s)* *Country Chart*

8 AT applies to entire entry AT Column 1

a.3. Optical opacity switches (filters) with a field of view of 30° or wider and a response time equal to or less than 1 ns;

9 **License Exceptions**

10 LVS: N/A
11 GBS: N/A
12 CIV: N/A

b. “Fluoride fiber” cable, or optical fibers therefor, having an attenuation of less than 4 dB/km in the wavelength range exceeding 1,000 nm but not exceeding 3,000 nm.

13 **List of Items Controlled**

14 *Unit:* Equipment in number; parts and accessories in \$ value
15 *Related Controls:* N/A
16 *Related Definitions:* N/A
17 *Items:*

6A995 “Lasers”, not controlled by 0B001.g.5, 0B001.h.6, 6A005 or 6A205.

License Requirements

18 a. Optical filters:

Reason for Control: AT

19 a.1. For wavelengths longer than 250 nm, comprised of multi-layer optical coatings and having either of the following:

Control(s) *Country Chart*

AT applies to entire entry AT Column 1

20 a.1.a. Bandwidths equal to or less than 1 nm Full Width Half Intensity (FWHI) and peak transmission of 90% or more; *or*

License Exceptions

21 a.1.b. Bandwidths equal to or less than 0.1 nm FWHI and peak transmission of 50% or more;

LVS: N/A
GBS: N/A
CIV: N/A

22 *Note: 6A994 does not control optical filters with fixed air gaps or Lyot-type filters.*

List of Items Controlled

23 a.2. For wavelengths longer than 250 nm, and having all of the following:

Unit: Equipment in number; parts and accessories in \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

24 a.2.a. Tunable over a spectral range of

a. Carbon dioxide (CO₂) “lasers” having any of the following:

2 a.1. A CW output power exceeding 10 kW;

d.1.a.1. A ‘wall-plug efficiency’ exceeding 12% and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1kHz; *or*

3 a.2. A pulsed output with a “pulse duration” exceeding 10 microseconds; *and*

d.1.a.2. An “average output power” exceeding 20 W; *or*

4 a.2.a. An average output power exceeding 10 kW; *or*

d.1.b. A multiple transverse mode output and having any of the following:

6 a.2.b. A pulsed “peak power” exceeding 100 kW; *or*

d.1.b.1. A ‘wall-plug efficiency’ exceeding 18% and an “average output power” exceeding 30W;

8 a.3. A pulsed output with a “pulse duration” equal to or less than 10 microseconds; *and*

d.1.b.2. A “peak power” exceeding 200 MW; *or*

9 a.3.a. A pulse energy exceeding 5 J per pulse and “peak power” exceeding 2.5 kW; *or*

d.1.b.3. An “average output power” exceeding 50 W; *or*

11 a.3.b. An average output power exceeding 2.5 kW;

12 b. Semiconductor lasers, as follows:

d.2. A “pulse duration” exceeding 1 μs and having any of the following:

13 b.1. Individual, single-transverse mode semiconductor “lasers” having:

d.2.a. A single transverse mode output and having any of the following:

15 b.1.a. An average output power exceeding 100 mW; *or*

d.2.a.1. A ‘wall-plug efficiency’ exceeding 12% and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; *or*

16 b.1.b. A wavelength exceeding 1,050 nm;

d.2.a.2. An “average output power” exceeding 20 W; *or*

18 b.2. Individual, multiple-transverse mode semiconductor “lasers”, or arrays of individual semiconductor “lasers”, having a wavelength exceeding 1,050 nm;

d.2.b. A multiple transverse mode output and having any of the following:

20 c. Ruby “lasers” having an output energy exceeding 20 J per pulse;

d.2.b.1. A ‘wall-plug efficiency’ exceeding 18% and an “average output power” exceeding 30 W; *or*

22 d. Non-“tunable” “pulsed lasers” having an output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:

d.2.b.2. An “average output power” exceeding 500 W;

24 d.1. A “pulse duration” equal to or exceeding 1 ns but not exceeding 1 μs, and having any of the following:

e. Non-“tunable” continuous wave “(CW) lasers”, having an output wavelength exceeding 975 nm but not exceeding 1,150nm and having any of the following:

26 d.1.a. A single transverse mode output and having any of the following:

2 e.1. A single transverse mode output and
3 having any of the following:

4 e.1.a. A ‘wall-plug efficiency’ exceeding
5 12% and an “average output power” exceeding 10
6 W and capable of operating at a pulse repetition
7 frequency greater than 1 kHz; *or*

8 • e.1.b. An “average output power”
9 exceeding 50 W; *or*

10 e.2. A multiple transverse mode output and
11 having any of the following:

12 e.2.a. A ‘wall-plug efficiency’ exceeding
13 18% and an "average output power" exceeding 30
14 W; *or*

15 e.2.b. An “average output power”
16 exceeding 500 W;

17 *Note: 6A995.e.1.b does not control
18 multiple transverse mode, industrial
19 "lasers" with output power less than o
20 equal to 2kW with a total mass greater
21 than 1,200kg. For the purpose of this
22 note, total mass includes all components
23 required to operate the "laser", e.g.,
24 "laser", power supply, heat exchanger,
25 but excludes external optics for beam
26 conditioning and/or delivery.*

27 f. Non-“tunable” “lasers”, having a wavelength
28 exceeding 1,400 nm, but not exceeding 1555 nm
and having any of the following:

29 f.1. An output energy exceeding 100 mJ per
30 pulse and a pulsed “peak power” exceeding 1 W;
31 *or*

32 f.2. An average or CW output power
33 exceeding 1 W.

34 **6A996 “Magnetometers” not controlled by
35 ECCN 6A006, “Superconductive”
36 electromagnetic sensors, and specially designed
37 components therefor, as follows (see List of
38 Items Controlled).**

License Requirements

Reason for Control: AT

Control(s)

Country Chart

AT applies to entire entry

AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

a. “Magnetometers”, n.e.s., having a “noise level”
(sensitivity) lower (better) than 1.0 nT rms per
square root Hz.

b. “Superconductive” electromagnetic sensors,
components manufactured from “superconductive”
materials:

b.1. Designed for operation at temperatures
below the “critical temperature” of at least one of
their “superconductive” constituents (including
Josephson effect devices or “superconductive”
quantum interference devices (SQUIDS));

b.2. Designed for sensing electromagnetic
field variations at frequencies of 1 KHz or less;
and

b.3. Having any of the following
characteristics:

b.3.a. Incorporating thin-film SQUIDS
with a minimum feature size of less than 2 μm and
with associated input and output coupling circuits;

b.3.b. Designed to operate with a magnetic
field slew rate exceeding 1 x 10⁶ magnetic flux
quanta per second;

2 b.3.c. Designed to function without
magnetic shielding in the earth’s ambient
3 magnetic field; or

AT applies to entire entry AT Column 1

License Exceptions

4 b.3.d. Having a temperature coefficient
5 less (smaller) than 0.1 magnetic flux quantum/K.

LVS: N/A
GBS: N/A
CIV: N/A

6 **6A997 Gravity meters (gravimeters) for
ground use, n.e.s.**

List of Items Controlled

7 **License Requirements**

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

8 *Reason for Control:* AT

9 *Control(s)* *Country Chart*

a. Airborne radar equipment, n.e.s., and specially
designed components therefor.

10 AT applies to entire entry AT Column 1

11 **License Exceptions**

b. “Space-qualified”“laser” radar or Light
Detection and Ranging (LIDAR) equipment
specially designed for surveying or for
meteorological observation.

12 LVS: N/A
13 GBS: N/A
14 CIV: N/A

**6A999 Specific processing equipment, as follows
(see List of Items Controlled).**

15 **List of Items Controlled**

License Requirements

16 *Unit:* \$ value
17 *Related Controls:* N/A
Related Definitions: N/A
Items:

Reason for Control: AT

18 a. Having a static accuracy of less (better) than
19 100 microgal; or

Control(s) *Country Chart*

20 b. Being of the quartz element (Worden) type.

AT applies to entire entry. A license is required
for items controlled by this entry to North Korea
for anti-terrorism reasons. The Commerce Country
Chart is not designed to determine AT licensing
requirements for this entry. See §742.19 of the
EAR for additional information.

21 **6A998 Radar systems, equipment and
22 assemblies, n.e.s., (see List of Items
Controlled), and specially designed
23 components therefor.**

License Exceptions

24 **License Requirements**

LVS: N/A
GBS: N/A
CIV: N/A

25 *Reason for Control:* RS, AT

26 *Control(s)* *Country Chart*

List of Items Controlled

27 RS applies to paragraph .b RS Column 1

Unit: \$ value
Related Controls: See also [6A203](#)

2 *Related Definitions:* N/A
3 *Items:*

- 4 a. Seismic detection equipment;
- 5 b. Radiation hardened TV cameras, n.e.s.

6B007 Equipment to produce, align and calibrate land-based gravity meters with a static accuracy of better than 0.1 mgal.

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry NS Column 2

AT applies to entire entry AT Column 1

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

6B004 Optical equipment, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry NS Column 2

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$5000
 GBS: Yes for 6B004.b
 CIV: Yes for 6B004.b

License Exceptions

LVS: \$5000
 GBS: N/A
 CIV: N/A

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the ECCN heading.

List of Items Controlled

Unit: Number
Related Controls: This entry does not control microscopes.
Related Definitions: N/A
Items:

a. Equipment for measuring absolute reflectance to an accuracy of ± 0.1% of the reflectance value;

b. Equipment other than optical surface scattering measurement equipment, having an unobscured aperture of more than 10 cm, specially designed for the non-contact optical measurement of a non-planar optical surface figure (profile) to an “accuracy” of 2 nm or less (better) against the required profile.

6B008 Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry NS Column 2

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

2 LVS: N/A
3 GBS: N/A
4 CIV: N/A

equipment, including tools, dies, fixtures or gauges, and other specially designed components and accessories therefor.

4 **List of Items Controlled**

License Requirements

5 *Unit:* Number
6 *Related Controls:* See also [6B108](#)
7 *Related Definitions:* N/A
8 *Items:*

Reason for Control: AT

Control(s) Country Chart

AT applies to entire entry AT Column 1

8 The list of items controlled is contained in the ECCN heading.

License Exceptions

9
10 **6B108 Systems, other than those controlled by**
11 **6B008, specially designed for radar cross**
12 **section measurement usable for rockets,**
13 **missiles, or unmanned aerial vehicles capable**
14 **of achieving a “range” equal to or greater than**
15 **300 km and their subsystems.**

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Equipment in number; parts and accessories in \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

13 **License Requirements**

14 *Reason for Control:* MT, AT

15 *Control(s)* Country Chart

16 MT applies to entire entry MT Column 1

17 AT applies to entire entry AT Column 1

a. For the manufacture or inspection of:

a.1. Free electron “laser” magnet wigglers;

a.2. Free electron “laser” photo injectors;

b. For the adjustment, to required tolerances, of the longitudinal magnetic field of free electron “lasers”.

18 **License Exceptions**

19 LVS: N/A
20 GBS: N/A
21 CIV: N/A

21 **List of Items Controlled**

C. MATERIALS

22 *Unit:* Number
23 *Related Controls:* N/A
24 *Related Definitions:* N/A
25 *Items:*

6C002 Optical sensor materials, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s) Country Chart

25 The list of items controlled is contained in the ECCN heading.

26 **6B995 Specially designed or modified**

2 NS applies to entire entry NS Column 2

License Exceptions

3 AT applies to entire entry AT Column 1

LVS: \$1500
 GBS: Yes for 6C004.a and .e
 CIV: Yes for 6C004.a and .e

4 **License Exceptions**

5 LVS: \$3000
 6 GBS: N/A
 CIV: N/A

List of Items Controlled

Unit: \$ value
Related Controls: See also [6C994](#)
Related Definitions: N/A
Items:

7 **List of Items Controlled**

8 *Unit:* Number
 9 *Related Controls:* See also [6C992](#)
 10 *Related Definitions:* N/A
 11 *Items:*

12 a. Elemental tellurium (Te) of purity levels of
 11 99.9995% or more;

13 b. Single crystals (including epitaxial wafers) of
 12 any of the following:

14 b.1. Cadmium zinc telluride (CdZnTe), with
 zinc content less than 6% by mole fraction;

15 b.2. Cadmium telluride (CdTe) of any purity
 level; *or*

16 b.3. Mercury cadmium telluride (HgCdTe) of
 17 any purity level.

18 **Technical Note:** Mole fraction is defined
 19 as the ratio of moles of ZnTe to the sum of the
 moles of CdTe and ZnTe present in the crystal.

20 **6C004 Optical materials, as follows (see List of**
 21 **Items Controlled).**

22 **License Requirements**

23 *Reason for Control:* NS, AT

24 *Control(s)* Country Chart

25 NS applies to entire entry NS Column 2

26 AT applies to entire entry AT Column 1

a. Zinc selenide (ZnSe) and zinc sulphide (ZnS)
 “substrate blanks” produced by the chemical vapor
 deposition process, having any of the following:

a.1. A volume greater than 100 cm³; *or*

a.2. A diameter greater than 80 mm having a
 thickness of 20 mm or more;

b. Boules of the following electro-optic materials:

b.1. Potassium titanyl arsenate (KTA);

b.2. Silver gallium selenide (AgGaSe₂);

b.3. Thallium arsenic selenide (Tl₃AsSe₃, also
 known as TAS);

c. Non-linear optical materials, having all of the
 following:

c.1. Third order susceptibility (χ^3) of 10⁻⁶
 m²/V² or more; *and*

c.2. A response time of less than 1 ms;

d. “Substrate blanks” of silicon carbide or
 beryllium beryllium (Be/Be) deposited materials
 exceeding 300 mm in diameter or major axis
 length;

e. Glass, including fused silica, phosphate glass,
 fluorophosphate glass, zirconium fluoride (ZrF₄)
 and hafnium fluoride (HfF₄), having all of the
 following:

e.1. A hydroxyl ion (OH-) concentration of

2 less than 5 ppm;

3 e.2. Integrated metallic purity levels of less
than 1 ppm; *and*

4 e.3. High homogeneity (index of refraction
5 variance) less than 5×10^{-6} ;

6 f. Synthetically produced diamond material with
7 an absorption of less than 10^{-5} cm^{-1} for
wavelengths exceeding 200 nm but not exceeding
8 14,000 nm.

**6C992 Optical sensing fibers not controlled by
6A002.d.3 which are modified structurally to
have a ‘beat length’ of less than 500 mm (high
birefringence) or optical sensor materials not
described in 6C002.b and having a zinc content
of equal to or more than 6% by ‘mole fraction.’**

License Requirements

Reason for Control: AT

<i>Control(s)</i>	<i>Country Chart</i>
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

11 **6C005 Synthetic crystalline “laser” host
12 material in unfinished form, as follows (see
List of Items Controlled).**

List of Items Controlled

Unit: Equipment in number; parts and
accessories in \$ value
Related Controls: N/A
Related Definitions: ‘Mole fraction’ is defined
as the ratio of moles of ZnTe to the sum of the
moles of CdTe and ZnTe present in the crystal.
2) ‘Beat length’ is the distance over which two
orthogonally polarized signals, initially in
phase, must pass in order to achieve a 2 Pi
radian(s) phase difference.
Items:

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

The list of items controlled is contained in the
ECCN heading.

License Exceptions

LVS: \$1500
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items:

6C994 Optical materials.

License Requirements

Reason for Control: AT

a. Titanium doped sapphire;

b. Alexandrite.

<i>Control(s)</i>	<i>Country Chart</i>
AT applies to entire entry	AT Column 1

2 License Exceptions

Reason for Control: NS, MT, NP, RS, AT

3 LVS: N/A
 4 GBS: N/A
 4 CIV: N/A

Control(s) *Country Chart*

NS applies to “software”
 for equipment controlled
 by 6A004, 6A005, 6A008 or
 6B008 NS Column 1

5 List of Items Controlled

6 *Unit:* Equipment in number; parts and
 accessories in \$ value

7 *Related Controls:* N/A

8 *Related Definitions:* 1) ‘Fluoride fibers’ are
 fibers manufactured from bulk fluoride
 9 compounds. 2) ‘Optical fiber preforms’ are
 bars, ingots, or rods of glass, plastic or other
 10 materials that have been specially processed
 for use in fabricating optical fibers. The
 characteristics of the preform determine the
 11 basic parameters of the resultant drawn
 optical fibers.

12 *Items:*

MT applies to “software”
 for equipment controlled
 by 6A008 or 6B008 for MT
 reasons MT Column 1

NP applies to “software”
 for equipment controlled
 by 6A005 for NP reasons NP Column 1

RS applies to “software”
 for equipment controlled by
 6A008.j.1 RS Column 1

13 a. Low optical absorption materials, as follows:

AT applies to entire entry AT Column 1

14 a.1. Bulk fluoride compounds containing
 ingredients with a purity of 99.999% or better; *or*

15 *Note:* 6C994.a.1 controls fluorides of
 16 zirconium or aluminum and variants.

17 a.2. Bulk fluoride glass made from
 compounds controlled by 6C004.e.1;

18 b. ‘Optical fiber preforms’ made from bulk
 19 fluoride compounds containing ingredients with a
 20 purity of 99.999% or better, specially designed for
 the manufacture of ‘fluoride fibers’ controlled by
 21 6A994.b.

License Requirement Notes: See §743.1 of
 the EAR for reporting requirements for exports
 under License Exceptions

License Exceptions

CIV: N/A

TSR: Yes, except for the following:
 1) Items controlled for MT reasons;
 2) “Software” specially designed for
 the “development” or “production” of
 “space qualified” “laser” radar or
 Light Detection and Ranging (LIDAR)
 equipment defined in 6A008.j.1; or
 3) Exports or reexports to destinations
 outside of Austria, Belgium, Canada,
 Denmark, Finland, France, Germany,
 Greece, Ireland, Italy, Japan,
 Luxembourg, the Netherlands,
 Portugal, Spain, Sweden, or the United
 Kingdom of “software” specially
 designed for the “development” or
 “production” of equipment controlled
 by 6A008.1.3 or 6B008.

D. SOFTWARE

24 **6D001 “Software” specially designed for the**
 25 **“development” or “production” of equipment**
controlled by 6A004, 6A005, 6A008 or 6B008.

26 License Requirements

2 **List of Items Controlled**

3 *Unit:* \$ value
 4 *Related Controls:* “Software” specially
 5 designed for the “development” or
 6 “production” of “space qualified” components
 7 for optical systems defined in [6A004.c](#) and
 8 “space qualified” optical control equipment
 9 defined in [6A004.d.1](#) is subject to the export
 10 licensing authority of the Department of State,
 11 Directorate of Defense Trade Controls (22
 12 CFR part 121). See also [6D991](#), and ECCN
 13 [6E001](#) (“development”) for “technology” for
 14 items controlled under this entry.
 15 *Related Definitions:* N/A
 16 *Items:*

17 The list of items controlled is contained in the
18 ECCN heading.

19 **6D002 “Software” specially designed for the
20 “use” of equipment controlled by 6A002.b,
21 6A008 or 6B008.**

22 **License Requirements**

23 *Reason for Control:* NS, MT, RS, AT

24 <i>Control(s)</i>	25 <i>Country Chart</i>
26 NS applies to entire entry	27 NS Column 1
28 MT applies to “software” for equipment controlled by 6A008 or 6B008 for MT reasons	MT Column 1
RS applies to “software” for equipment controlled by 6A008.j.1	RS Column 1
AT applies to entire entry	AT Column 1

29 **License Exceptions**

30 CIV: N/A
 31 TSR: Yes, except N/A for the following
 32 1) Items controlled for MT reasons;
 33 or

2) “Software” specially designed for the “use” of “space qualified” “laser” radar or Light Detection and Ranging (LIDAR) equipment defined in 6A008.j.1.

List of Items Controlled

Unit: \$ value
Related Controls: “Software” specially
 designed for the “use” of “space qualified”
 imaging sensors (e.g., “monospectral imaging
 sensors” and “multispectral imaging sensors”)
 defined in [6A002.b.2.b.1](#) is subject to the
 export licensing authority of the Department of
 State, Directorate of Defense Trade Controls
 (22 CFR part 121), unless, on or after
 September 23, 2002, the Department of State
 issues a commodity jurisdiction determination
 assigning the export licensing authority to the
 Department of Commerce, Bureau of Industry
 and Security. “Software” specially designed
 for the “use” of “space qualified” LIDAR
 equipment specially designed for surveying or
 for meteorological observation, released from
 control under the note in [6A008.j](#), is controlled
 in [6D991](#). See also [6D102](#), [6D991](#), and [6D992](#)
Related Definitions: N/A
Items:

The list of items controlled is contained in the
ECCN heading.

**6D003 Other “software”, as follows (see List of
Items Controlled).**

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

2 License Exceptions

“software”, as follows:

- 3 CIV: Yes for 6D003.h.1
- 4 ● TSR: Yes, except for exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of “software” for items controlled by 6D003.a.

f.1. “Software” specially designed for magnetic and electric field “compensation systems” for magnetic sensors designed to operate on mobile platforms;

f.2. “Software” specially designed for magnetic and electric field anomaly detection on mobile platforms;

g. Gravimeters. “Software” specially designed to correct motional influences of gravity meters or gravity gradiometers;

9 List of Items Controlled

h. Radar “software”, as follows:

10 Unit: \$ value
 11 Related Controls: See also [6D103](#) and [6D993](#)
 12 Related Definitions: N/A
 13 Items:

h.1. Air Traffic Control “software” application “programs” hosted on general purpose computers located at Air Traffic Control centers and capable of any of the following:

- 14 a. Acoustics “software”, as follows:
 - 15 a.1. “Software” specially designed for acoustic beam forming for the “real time processing” of acoustic data for passive reception using towed hydrophone arrays;
 - 16 a.2. “Source code” for the “real time processing” of acoustic data for passive reception using towed hydrophone arrays;
 - 17 a.3. “Software” specially designed for acoustic beam forming for the “real time processing” of acoustic data for passive reception using bottom or bay cable systems;
 - 18 a.4. “Source code” for the “real time processing” of acoustic data for passive reception using bottom or bay cable systems.

h.1.a. Processing and displaying more than 150 simultaneous “system tracks”; or

h.1.b. Accepting radar target data from more than four primary radars;

h.2. “Software” for the design or “production” of radomes which:

h.2.a. Are specially designed to protect the “electronically steerable phased array antennae” controlled by 6A008.e.; and

h.2.b. Result in an antenna pattern having an “average side lobe level” more than 40 dB below the peak of the main beam level.

Technical Note: “Average side lobe level” in 6D003.h.2.b is measured over the entire array excluding the angular extent of the main beam and the first two side lobes on either side of the main beam.

- 22 b. Optical sensors. None.
- 23 c. Cameras. None.
- 24 d. Optics. None.
- 25 e. Lasers. None
- 26 f. Magnetic and Electric Field Sensors

6D102 “Software” specially designed or modified for the “use” of goods controlled by 6A108.

2 License Requirements ECCN heading.

3 Reason for Control: MT, AT
 Control(s) Country Chart

4 MT applies to entire entry MT Column 1

5 AT applies to entire entry AT Column 1

6D991 “Software” specially designed for the “development”, “production”, or “use” of equipment controlled by 6A002.e, 6A991, 6A996, 6A997, or 6A998.

6 License Exceptions

7 CIV: N/A
 8 TSR: N/A

Reason for Control: RS, AT

Control(s) Country Chart

9 List of Items Controlled

10 Unit: \$ value
 11 Related Controls: N/A
 12 Related Definitions: N/A
 13 Items:

RS applies to “software” for equipment controlled by 6A002.e or 6A998.b RS Column 1

AT applies to entire entry, except “software” for equipment controlled by 6A991 AT Column 1

14 The list of items controlled is contained in the ECCN heading.

AT applies to “software” for equipment controlled by 6A991 AT Column 2

15 6D103 “Software” that processes post-flight, recorded data, enabling determination of vehicle position throughout its flight path, specially designed or modified for “missiles”.

License Exceptions

17 License Requirements

CIV: N/A
 TSR: N/A

18 Reason for Control: MT, AT

List of Items Controlled

19 Control(s) Country Chart

Unit: \$ value
 Related Controls: N/A
 Related Definitions: N/A
 Items:

20 MT applies to entire entry MT Column 1

21 AT applies to entire entry AT Column 1

The list of items controlled is contained in the ECCN heading.

22 License Exceptions

23 CIV: N/A
 24 TSR: N/A

25 List of Items Controlled

Unit: \$ value

6D992 “Software” specially designed for the “development” or “production” of equipment controlled by 6A992, 6A994, or 6A995.

26 The list of items controlled is contained in the

License Requirements

2 *Reason for Control:* AT computers located at Air Traffic Control centers,
 3 *Control(s)* *Country Chart* and capable of automatically handing over primary
 4 AT applies to entire entry AT Column 1 radar target data (if not correlated with secondary
 surveillance radar (SSR) data) from the host ATC
 center to another ATC center;

5 **License Exceptions**

6 CIV: N/A
 7 TSR: N/A

E. TECHNOLOGY

8 **List of Items Controlled**

9 *Unit:* \$ value
 10 *Related Controls:* N/A
 11 *Related Definitions:* N/A
 12 *Items:*

13 The list of items controlled is contained in the
 14 ECCN heading.

**6E001 “Technology” according to the General
 Technology Note for the “development” of
 equipment, materials or “software” controlled
 by 6A (except 6A991, 6A992, 6A994, 6A995,
 6A996, 6A997, or 6A998), 6B (except 6B995), 6C
 (except 6C992 or 6C994), or 6D (except 6D991,
 6D992, or 6D993).**

License Requirements

Reason for Control: NS, MT, NP, RS, CC,
 AT, UN

15 **6D993 Other “software” not controlled by
 16 6D003.**

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

18 AT applies to entire entry AT Column 1

License Exceptions

20 CIV: N/A
 21 TSR: N/A

List of Items Controlled

22 *Unit:* Equipment in number; parts and
 23 accessories in \$ value
 24 *Related Controls:* N/A
 25 *Related Definitions:* N/A
 26 *Items:*

27 a. Air Traffic Control (ATC) “software”
 application “programs” hosted on general purpose

Control(s) *Country Chart*

NS applies to “technology” NS Column 1
 for items controlled by
 6A001 to 6A008, 6B004 to
 6B008, 6C002 to 6C005,
 or 6D001 to 6D003

MT applies to “technology” MT Column 1

for items controlled by
 6A002, 6A007, 6A008,
 6A102, 6A107, 6A108,
 6B008, 6B108, 6D001,
 6D002, 6D102 or
 6D103 for MT reasons

NP applies to “technology” NP Column 1

for equipment controlled by
 6A003, 6A005, 6A202,
 6A203, 6A205, 6A225,
 6A226 or 6D001 for
 NP reasons

RS applies to “technology” RS Column 1

for equipment controlled by
 6A002.a.1, .a.2, .a.3, .c, or

2 .e, 6A003.b.3 or .b.4,
3 or 6A008.j.1

4 CC applies to “technology” CC Column 1
for equipment controlled by
6A002 for CC reasons

5 AT applies to entire entry AT Column 1

6 UN applies to “technology” Iraq, North
7 for equipment controlled by Korea, and
8 6A002 or 6A003 for UN Rwanda
reasons

9 **License Requirement Notes:** See §743.1 of
10 the EAR for reporting requirements for exports
under License Exceptions.

11 **License Exceptions**

12 CIV: N/A
13 TSR: Yes, except for the following:
14 1) Items controlled for MT reasons;
15 2) “Technology” for commodities
16 controlled by 6A002.e, 6A004.e, or
17 6A008.j.1;
18 3) “Technology” for “software”
19 specially designed for “space
20 qualified” “laser” radar or Light
21 Detection and Ranging (LIDAR)
22 equipment defined in 6A008.j.1 and
23 controlled by 6D001 or 6D002;
24 4) Exports or reexports to
25 destinations outside of Austria,
26 Belgium, Canada, Denmark, Finland,
27 France, Germany, Greece, Ireland,
Italy, Japan, Luxembourg, the
Netherlands, Portugal, Spain,
Sweden, or the United Kingdom of
“technology” for the “development”
of the following: (a) Items controlled
by 6A001.a.1.b.1, 6A001.a.2.a.1,
6A001.a.2.a.2, 6A001.a.2.a.3,
6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b,
6A001.a.2.e., 6A002.a.1.c, 6A008.l.3,
6B008, 6D003.a; (b) Equipment
controlled by 6A001.a.2.c or
6A001.a.2.f when specially designed
for real time applications; or (c)

“Software” controlled by 6D001 and
specially designed for the
“development” or “production” of
equipment controlled by 6A008.l.3 or
6B008; or
5) Exports or reexports to Rwanda.

List of Items Controlled

Unit: N/A
Related Controls: “Technology” according to
the General Technology Note for the
“development” of the following commodities
is subject to the export licensing authority of
the Department of State, Directorate of
Defense Trade Controls (22 CFR part 121):
“Space qualified” 1.) Components for optical
systems defined in 6A004.c and optical control
equipment defined in 6A004.d.1.; 2.) Solid-
state detectors defined in 6A002.a.1, “imaging
sensors” (e.g., “monospectral imaging sensors”
and “multispectral imaging sensors”) defined
in 6A002.b.2.b.1, and cryocoolers defined in
6A002.d.1 unless on or after September 23,
2002, the Department of State issues a
commodity jurisdiction determination
assigning the export licensing authority to the
Department of Commerce, Bureau of Industry
and Security. See also 6E101, 6E201, and
6E991

Related Definitions: N/A
Items:

The list of items controlled is contained in the
ECCN heading.

**6E002 “Technology” according to the General
Technology Note for the “production” of
equipment or materials controlled by 6A (except
6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or
6A998), 6B (except 6B995) or 6C (except 6C992
or 6C994).**

License Requirements

Reason for Control: NS, MT, NP, RS, CC,
AT, UN

Control(s) *Country Chart*

2 NS applies to “technology” NS Column 1
 3 for equipment controlled by
 4 6A001 to 6A008, 6B004 to
 6B008, or 6C002 to 6C005

5 MT applies to “technology” MT Column 1
 6 for equipment controlled by
 7 6A002, 6A007, 6A008, 6A102,
 6A107, 6A108, 6B008, or
 6B108 for MT reasons

8 NP applies to “technology” NP Column 1
 9 for equipment controlled by
 10 6A003, 6A005, 6A202, 6A203,
 6A205, 6A225 or 6A226 for
 NP reasons

11 RS applies to “technology” RS Column 1
 12 for equipment controlled by
 13 6A002.a.1, .a.2, .a.3, .c or .e,
 6A003.b.3 or .b.4, or 6A008.j.1

14 CC applies to “technology” CC Column 1
 15 for equipment controlled by
 6A002 for CC reasons

16 AT applies to entire entry AT Column 1

17 UN applies to “technology” Iraq, North
 18 for equipment controlled by Korea, and
 6A002 or 6A003 for UN Rwanda
 reasons

19 **License Requirement Notes:** See §743.1 of
 20 the EAR for reporting requirements for exports
 under License Exceptions.

21 **License Exceptions**

- 22 CIV: N/A
 23 TSR: Yes, except for the following:
 24 1) Items controlled for MT reasons;
 25 2) “Technology” for commodities
 26 controlled by 6A002.e, 6A004.e,
 27 6A008.j.1;
 28 3) Exports or reexports to
 destinations outside of Austria,
 Belgium, Canada, Denmark, Finland,
 France, Germany, Greece, Ireland,

Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of “technology” for the “development” of the following: (a) Items controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, and 6A001.a.2.c; and (b) Equipment controlled by 6A001.a.2.e and 6A001.a.2.f when specially designed for real time applications; or (c) “Software” controlled by 6D001 and specially designed for the “development” or “production” of equipment controlled by 6A002.a.1.c, 6A008.l.3 or 6B008; or
 4) Exports or reexports to Rwanda.

List of Items Controlled

Unit: N/A

Related Controls: “Technology” according to the General Technology Note for the “production” of the following commodities is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121) when intended for use on a satellite: “Space qualified” 1.) Components for optical systems defined in [6A004.c](#) and optical control equipment defined in [6A004.d.1](#); 2.) Solid-state detectors defined in [6A002.a.1](#), “imaging sensors” (e.g., “monospectral imaging sensors” and “multispectral imaging sensors”) defined in [6A002.b.2.b.1](#), and cryocoolers defined in [6A002.d.1](#) unless on or after September 23, 2002, the Department of State issues a commodity jurisdiction determination assigning the export licensing authority to the Department of Commerce, Bureau of Industry and Security. See also [6E992](#).

Related Definitions: N/A

Items:

The list of items controlled is contained in the ECCN heading.

2 **6E003 Other “technology”, as follows (see List of Items Controlled).**

designed diagnostic instruments or targets in test facilities for “SHPL” testing or testing or evaluation of materials irradiated by “SHPL” beams;

3 **License Requirements**

4 *Reason for Control:* NS, AT

f. Magnetic and Electric Field Sensors. None

5 *Control(s)* *Country Chart*

g. Gravimeters. None

6 NS applies to entire entry NS Column 1

h. Radar. None

7 AT applies to entire entry AT Column 1

8 **License Exceptions**

9 CIV: N/A

10 TSR: Yes

6E101 “Technology” according to the General Technology Note for the “use” of equipment or “software” controlled by 6A002, 6A007.b and .c, 6A008, 6A102, 6A107, 6A108, 6B108, 6D102 or 6D103.

11 **List of Items Controlled**

License Requirements

12 *Unit:* N/A

Reason for Control: MT, AT

13 *Related Controls:* See also [6E993](#)

Control(s) *Country Chart*

14 *Related Definitions:* N/A

14 *Items:*

MT applies to entire entry MT Column 1

15 a. Acoustics. None.

AT applies to entire entry AT Column 1

16 b. Optical sensors. None.

License Exceptions

17 c. Cameras. None.

CIV: N/A

TSR: N/A

18 d. Optics, “technology”, as follows:

List of Items Controlled

19 d.1. Optical surface coating and treatment
20 “technology” “required” to achieve uniformity of
21 99.5% or better for optical coatings 500 mm or
22 more in diameter or major axis length and with a
total loss (absorption and scatter) of less than 5×10^{-3} ;

Unit: N/A

Related Controls: N/A

Related Definitions: 1.) This entry only controls “technology” for equipment controlled by 6A008 when it is designed for airborne applications and is usable in “missiles”. 2.) This entry only controls “technology” for items in 6A002.a.1, a.3, and .e that are specially designed or modified to protect “missiles” against nuclear effects (e.g., Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for “missiles.” 3.) This entry only controls “technology” for items in 6A007.b and .c when the accuracies in 6A007.b.1 and b.2 are met or exceeded.

23 *N.B.:* See also 2E003.f.

24 d.2. Optical fabrication “technology” using
single point diamond turning techniques to
25 produce surface finish accuracies of better than 10
nm rms on non-planar surfaces exceeding 0.5 m²;

26 e. Lasers. “Technology” “required” for the
27 “development”, “production” or “use” of specially

2 *Items:* *Reason for Control:* RS, AT

3 The list of items controlled is contained in the *Control(s)* *Country Chart*
 ECCN heading.

4 •6E201 “Technology” according to the *Control(s)* *Country Chart*
 General Technology Note for the “use” of RS applies to “technology”
 equipment controlled by 6A003.a.2, 6A003.a.3, RS Column 1
 5 6A003.a.4; 6A005.a.2, 6A005.b.2.b, for equipment controlled by
 6 6A005.b.3.a, 6A005.b.4.b, 6A005.b.6.b, AT applies to entire entry AT Column 1
 7 6A005.c.1.b, 6A005.c.2.b, 6A005.d.3.c, or except “technology” for
 8 6A005.d.4.c (as described in the license equipment controlled by 6A991
 requirement note to 6A005); 6A202, 6A203, AT applies to “technology” AT Column 2
 9 6A205, 6A225 or 6A226. for equipment controlled
 by 6A991

10 **License Requirements**

11 *Reason for Control:* NP, AT

12 *Control(s)* *Country Chart*

13 NP applies to entire entry NP Column 1

14 AT applies to entire entry AT Column 1

15 **License Exceptions**

16 CIV: N/A
 TSR: N/A

17 **List of Items Controlled**

18 *Unit:* N/A
 19 *Related Controls:* N/A
 20 *Related Definitions:* N/A
 ECCN Controls: This entry only controls
 “technology” for “lasers” in 6A005 that are
 21 controlled for NP reasons.
Items:

22 The list of items controlled is contained in the
 ECCN heading.

23

24 **6E991 “Technology” for the “development”,**
 “production” or “use” of equipment controlled
 25 by 6A991, 6A996, 6A997, or 6A998.

26 **License Requirements**

27

License Exceptions

CIV: N/A
 TSR: N/A

List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items:

The list of items controlled is contained in the
 ECCN heading.

6E992 “Technology” for the “development” or
 “production” of equipment, materials or
 “software” controlled by 6A992, 6A994, or
 6A995, 6B995, 6C992, 6C994, or 6D993.

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A
 TSR: N/A

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List of Items Controlled

10 m² of surface area per year on any single spindle and with:

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

- a.1. An area exceeding 1 m²; *and*
- a.2. A surface figure exceeding lambda/10 rms at the designed wavelength;

The list of items controlled is contained in the ECCN heading.

b. “Technology” for optical filters with a bandwidth equal to or less than 10 nm, a field of view (FOV) exceeding 40° and a resolution exceeding 0.75 line pairs per milliradian;

6E993 Other “technology”, not controlled by 6E003, as follows (see List of Items Controlled).

c. “Technology” for the “development” or “production” of cameras controlled by 6A993;

License Requirements

Reason for Control: AT

d. “Technology” “required” for the “development” or “production” of non-triaxial fluxgate “magnetometers” or non-triaxial fluxgate “magnetometer” systems, having any of the following:

Control(s) Country Chart

AT applies to entire entry AT Column 1

d.1. A “noise level” of less than 0.05 nT rms per square root Hz at frequencies of less than 1 Hz; *or*

License Exceptions

CIV: N/A
TSR: N/A

d.2. A “noise level” of less than 1 x 10⁻³ nT rms per square root Hz at frequencies of 1 Hz or more.

List of Items Controlled

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items:

EAR99 Items subject to the EAR that are *not* elsewhere specified in this CCL Category *or* in any other category in the CCL are designated by the number **EAR99**.

a. Optical fabrication technologies for serially producing optical components at a rate exceeding

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EXHIBIT E

1
2 15 C.F.R. § 764.3 - SANCTIONS

3 **(a) Administrative**

4 Violations of the EAA, the EAR, or any order, license or
5 authorization issued thereunder are subject to the administrative
6 sanctions described in this section and to any other liability, sanction,
or penalty available under law. The protective administrative
measures that are described in §764.6 of this part are distinct from
administrative sanctions.

7 **(1) Civil monetary penalty.**

8 (i) A civil monetary penalty not to exceed the amount set forth in
9 the EAA may be imposed for each violation, and in the event that any
10 provision of the EAR is continued by IEEPA or any other authority,
the maximum monetary civil penalty for each violation shall be that
provided by such other authority.

11 (ii) The payment of any civil penalty may be made a condition, for
12 a period not exceeding one year after the imposition of such penalty,
to the granting, restoration, or continuing validity of any export
13 license, License Exception, permission, or privilege granted or to be
granted to the person upon whom such penalty is imposed.

14 (iii) The payment of any civil penalty may be deferred or
15 suspended in whole or in part during any probation period that may
be imposed. Such deferral or suspension shall not bar the collection
16 of the penalty if the conditions of the deferral, suspension, or
probation are not fulfilled.

17 **(2) Denial of export privileges.** An order may be issued that
18 restricts the ability of the named persons to engage in export and
reexport transactions involving items subject to the EAR, or that
19 restricts access by named persons to items subject to the EAR. An
order denying export privileges may be imposed either as a sanction
20 for a violation specified in this part or as a protective administrative
measure described in §764.6(c) or (d) of this part. An order denying
21 export privileges may suspend or revoke any or all outstanding
licenses issued under the EAR to a person named in the denial order
22 or in which such person has an interest, may deny or restrict exports
and reexports by or to such person of any item subject to the EAR,
23 and may restrict dealings in which that person may benefit from any
export or reexport of such items. The standard terms of a denial
24 order are set forth in Supplement No. 1 to this part. A non-standard
denial order, narrower in scope, may be issued. Authorization to
25 engage in actions otherwise prohibited by a denial order may be
given by the Office of Exporter Services, in consultation with the
26 Office of Export Enforcement, following application by a person
named in the denial order or by a person seeking permission to deal
27 with a named person.

1 **(3) Exclusion from practice.** Any person acting as an
2 attorney, accountant, consultant, freight forwarder, or in any other
3 representative capacity for any license application or other matter
before BIS may be excluded by order from any or all such activities
before BIS.

4 **(b) Criminal¹**

5 (1) General. Except as provided in paragraph (b)(2) of this
6 section, whoever knowingly violates or conspires to or attempts to
7 violate the EAA, EAR, or any order or license issued thereunder,
8 shall be fined not more than five times the value of the exports or
reexports involved or \$50,000, whichever is greater, or imprisoned
not more than five years, or both.

9 (2) Willful violations.

10 (i) Whoever willfully violates or conspires to or attempts to violate
11 any provision of the EAA, the EAR, or any order or license issued
12 thereunder, with knowledge that the exports involved will be used for
13 the benefit of, or that the destination or intended destination of items
14 involved is, any controlled country or any country to which exports or
reexports are controlled for foreign policy purposes, except in the
case of an individual, shall be fined not more than five times the
value of the export or reexport involved or \$1,000,000, whichever is
greater; and, in the case of an individual, shall be fined not more than
\$250,000, or imprisoned not more than 10 years, or both.

15 (ii) Any person who is issued a license under the EAA or the
16 EAR for the export or reexport of any items to a controlled country
17 and who, with knowledge that such export or reexport is being used
18 by such controlled country for military or intelligence gathering
19 purposes contrary to the conditions under which the license was
20 issued, willfully fails to report such use to the Secretary of Defense,
except in the case of an individual, shall be fined not more than five
times the value of the exports or reexports involved or \$1,000,000,
whichever is greater; and in the case of an individual, shall be fined
not more than \$250,000, or imprisoned not more than five years or

21 ¹ In the event that any part of the EAR is not under the authority of the
22 EAA, sanctions shall be limited to those provided for by such other
23 authority or by 18 U.S.C. 3571, a criminal code provision that establishes a
24 maximum criminal fine for a felony that is the greater of the amount
25 provided by the statute that was violated, or an amount not more than
26 \$500,000 for an organization. The Federal Sentencing Guidelines found in
27 §2M5.1 of Appendix 4 to Title 18 of the United States Code apply, to the
extent followed by the court, to sentencing for convictions for violating the
EAA.

1 both.

2 (iii) Any person who possesses any item with the intent to export
3 or reexport such item in violation of an export control imposed under
4 sections 5 or 6 of the EAA, the EAR, or any order or license issued
5 thereunder, or knowing or having reason to believe that the item
6 would be so exported or reexported, shall, in the case of a violation
7 of an export control imposed under section 5 of the EAA (or the EAR,
8 or any order or license issued thereunder with respect to such
9 control), be subject to the penalties set forth in paragraph (b)(2)(I) of
10 this section and shall in the case of a violation of an export control
11 imposed under section 6 of the EAA (or the EAR, or any order or
12 license issued thereunder with respect to such control), be subject to
13 the penalties set forth in paragraph (b)(1) of this section.

14 (iv) Any person who takes any action with intent to evade the
15 provisions of the EAA, the EAR, or any order or license issued
16 thereunder, shall be subject to the penalties set forth in paragraph
17 (b)(1) of this section, except that in the case of an evasion of an
18 export control imposed under sections 5 or 6 of the EAA (or the EAR,
19 or any order or license issued thereunder with respect to such
20 control), such person shall be subject to the penalties set forth in
21 paragraph (b)(2)(I) of this section.

22 (3) Other criminal sanctions. Conduct that constitutes a
23 violation of the EAA, the EAR, or any order, license or authorization
24 issued thereunder, or that occurs in connection with such a violation,
25 may also be prosecuted under other provisions of law, including 18
26 U.S.C. 371 (conspiracy), 18 U.S.C. 1001 (false statements), 18
27 U.S.C. 1341, 1343, and 1346 (mail and wire fraud), and 18 U.S.C.
28 1956 and 1957 (money laundering).

1 (c) **Other sanctions**

2 Conduct that violates the EAA, the EAR, or any order, license or
3 authorization issued thereunder, and other conduct specified in the
4 EAA may be subject to sanctions or other measures in addition to
5 criminal and administrative sanctions under the EAA or EAR. These
6 include, but are not limited to, the following:

7 (1) Statutory sanctions. Statutorily-mandated sanctions may be
8 imposed on account of specified conduct related to weapons
9 proliferation. Such statutory sanctions are not civil or criminal
10 penalties, but restrict imports and procurement (See section 11A of
11 the EAA, Multilateral Export Control Violations, and section 11C of
12 the EAA, Chemical and Biological Weapons Proliferation), or restrict
13 export licenses (See section 11B of the EAA, Missile Proliferation
14 Violations, and the Iran-Iraq Arms Non-Proliferation Act of 1992).

15 (2) Other sanctions and measures.

16 (I) *Seizure and forfeiture.* Items that have been, are being, or are

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intended to be, exported or shipped from or taken out of the United States in violation of the EAA, the EAR, or any order, license or authorization issued thereunder, are subject to being seized and detained as are the vessels, vehicles, and aircraft carrying such items. Seized items are subject to forfeiture. (50 U.S.C. app. 2411(g); 22 U.S.C. 401.)

(ii) *Cross-debarment.*

(A) The Department of State may deny licenses or approvals for the export or reexport of defense articles and defense services controlled under the Arms Export Control Act to persons indicted or convicted of specified criminal offenses, including violations of the EAA, or to persons denied export privileges by BIS or another agency. (22 CFR 126.7(a) and 127.11(a).)

(B) The Department of Defense, among other agencies, may suspend the right of any person to contract with the United States Government based on export control violations. (Federal Acquisition Regulations §9.407-2.)

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ATTORNEY'S CERTIFICATE OF SERVICE

I, certify: that I am an active member of the State Bar of California and not a party to the cause, and my business address is 10100 Santa Monica Blvd., #300, Los Angeles, CA 90067; that on August 11, 2008, I served the: **MOTION TO DISMISS INDICTMENT** in a separate, sealed envelope, with postage fully prepaid, in the United States mail at Los Angeles, County of Los Angeles, CA, each of which envelopes was addressed:

Rodin Rooyani
AUSA - Office of US Attorney
312 North Spring Street, 12th Floor
Los Angeles, CA 90012-4700

I declare under penalty of perjury that the foregoing is true and correct. Dated: August 11, 2008

/s/ Fay Arfa

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9 **IN THE UNITED STATES DISTRICT COURT**
10 **FOR THE CENTRAL DISTRICT OF CALIFORNIA**

12 **UNITED STATES OF AMERICA**

13 **Plaintiff,**

14 v.

15 **ZHI YONG GUO,**

16 **Defendant.**

) Case No.
) CR 08-461-JFW

) **MOTION TO DISMISS**
) **INDICTMENT**