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研究報告：**美歐出口管制與中國通用科技移轉**

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美歐出口管制與中國通用科技移轉

壹、前　言

就開發中國家而言，技術移轉是為促進國內技術升級的重要手段。就這點言，技術移轉通常指將他國高階技術藉由不同手段輸入本國後，用以開發科技知識，導入實用目的。在目前國際間，中華人民共和國〔下文簡稱中國〕為積極從事跨國技術移轉的國家之一。事實上，自 80 年代起，中國即不斷加速與國外進行技術合作與移轉，其主要技術來源為美國、香港及日本，與其在 50 年代僅仰賴蘇聯技術輸入的情況已有極大差異。

然而技術移轉不同於一般消費性商品的進出口，它往往受到輸出國出口管制與國際監控，因此指謂中國藉由技術移轉大力提升其國內技術水準，則對於目前國際雙邊及多邊敏感性技術出口管制的系統及成效便有深入瞭解的必要。本研究即本此關懷，企圖究明當前國際間高科技出口管制作為，並特別著重通用科技的移轉。由於中國對於美國高科技移轉最為重視，因此本研究將特別檢視美國對中國的出口管制措施。此外，2005 年上半年歐盟有意解除對中國武器禁運，引發美日與歐盟間的意見對立，如此歐洲的敏感技術出口管制機制又是如何？其與美國政策如何協調？上述爭議是否代表著各國與中國關係的實質改變？其對台海安全的影響又是什麼？最後國際通用科技出

口管制對於台灣軍事技術發展的意義又是什麼？皆為本研究關心議題。

貳、跨國技術移轉管道

技術在國際間的輸出入有諸多形式。以美國技術流入中國的型態看來，最基本的管道就是中國每年大量湧入美國的留學生。單單是2004 年，中國赴美留學生合計便超過六萬人，約為中國 20 所菁英大學的畢業生總人數。在這一管道中，除少數關係國家安全的研究領域外，技術交換與 know-how 取得基本上沒有太大設限。第二主要管道是藉由國際間的商業往來所獲取的技術移轉，美國早在 90 年代前就有超過百家公司釋出技術授權在中國製造相關產品，其他主要工業技術提供國家尚包含英、法、德、日等。而最具爭議的技術移轉就是先進與軍事技術的移轉，是為中共與美國第三技術流通管道，這一敏感範疇的技術流通管道雖也涉及兩國關係的轉變，但由於中國大量且系統獲取美國敏感技術，甚至運用間諜滲透手段，也一再引起美國政府的關切。

值得特別注意的是，對於先進技術的移轉往往不限定在單一管道，它經常以多導管道混合進行，甚至以合法掩護非法，暗中竊取敏感技術，更由於「通用」科技可以轉換為軍事敏感技術，因此所謂通用技術移轉可以說是國際軍品移轉與一般技術移轉間最為模糊的灰

色地帶，其流動型態極為複雜與多變，相當值得關注。本文對於歐美出口管制的觀察，將特別集中在通用科技的出口管制情形，對於一般傳統武器、大量毀滅武器等出口管制措施雖也略為提及，但非本研究的重點。

叁、美國出口管制系統

當前美國最主要的出口管制機制為 1979 年的「出口行政法案」（Export Administration Act, EAA），以及「武器出口管制法案」（Arms Export Control Act, AECA）。前者管制「通用」物資，由美國商業部管轄，後者管制軍備物資，由國務院管轄。此外，尚有六種輸出品由不同的部門管制：核能裝備與物資由核能管理委員會管制，麻醉與危險藥品由法務部管制，天然氣與電器能源由能源部管制，保護魚類與野生動物由內政部管制；專利由專利商標局管制；另有美國財政部海外資產管控辦公室負責海外資產的移轉事項。

一、出口行政法案（EAA）

美國出口管制極為複雜。它必須同時滿足不同的目的，又須回應國內不同意見與國際貿易的需求。該機制之肇始在因應戰時物資短缺，而於 1940 年開始採行出口管制。基於政治因素所執行的出口管制則始於二戰後的冷戰時期，1949 年「出口管制法」（Export Control

Act）正式禁止出口任何足以促進他國軍事或經濟發展以致影響美國安全的物資，「策略性」出口管制由是而生。美國出口管制的主要政策目的有三：保衛國家安全、達到外交政策目的、監控短缺物資的流出。「出口管制法」維持了 20 年，1969 年為「出口行政法案」所替代，1979 年再由現行「出口行政法案」（EAA）取代，其後歷經多次增修，後因國會遲遲無達成共識修頒正式法令，目前「出口行政法案」係以總統緊急行政授權延續其效力。

依據「出口行政法案」，商業部工業安全局（Bureau of Industry and Security）訂定「出口行政規定」（Export Administration Regulations, EAR）以落實策略性出口政策。在高科技管制方面，工業安全局所管控的就是軍民通用科技輸出。它最主要措施就是發布「商業管制清單」（Commerce Control List），將列入管制的商品、軟體、技術註明於清單中，以為管制執行的依據。該清單總計共分十大類別（如表 1），目前這十項類別共計包含 2,400 品項。清單中每個品項都有各自的「出口管制分類號碼」（Export Control Classification Number, ECCN），號碼中即標示著該品項受到管制的原因，以及必須獲取許可的種類。

表 1　美國商業管制清單分類

類　　別	內　　容
Category 0	核能物資、設施與裝備
Category 1	原料、化學、微生物、毒物
Category 2	物料加工
Category 3	電子
Category 4	電腦
Category 5	通訊與資訊安全
Category 6	感測與雷射
Category 7	導航與航電
Category 8	船舶
Category 9	推進系統、太空載具及相關設備

「出口行政規定」中另有所謂「貿易國家列表」(Commerce Country Chart),該表列示了每個國家對於不同管制原因所須辦理的出口許可,不同管制原因總計含 14 種,如表 2 所示。在國家量表中,台灣與中國被管制類目幾乎是相同的（如附錄 1),不過許可排除類別中,我國列為「B」群,**中國列為「D」群**,因而任何出口品項涉及「國家安全」、「生化武器」、「飛彈技術」,且欲輸往中國者均受管制（如附錄 2)。在另一項「實體清單」(Entity List）中,則明列**中國運載火箭技術研究院十三所等 19 個中國所屬機構,必須於採購進口物資時接受美國政府出口許可審查**（如附錄 3)。

表 2　美國貿易國家量表管制原因

類　　別	內　　容
AT	反恐怖主義
CB	生化武器
CC	犯罪預防
CW	化武協定
EI	加密物資
FC	軍武協定
MT	飛彈技術
NS	國家安全
NP	核子擴散
SS	區域穩定
UN	聯合國禁運
XP	電腦
SI	重要物資

出口管制並不表示必然禁止出口，而是需要申請輸出許可，此外，出口管制規定也有排除條款。

二、武器出口管制法案

武器出口管制法案（AECA）則是授權美國總統主導武器出口事宜。根據該法，國務院政治軍事事務局武器貿易控制單位訂定有「國際武器移轉規定」（International Traffic in Arms Regulations），同時將認定屬於需要管控的軍事物資與服務列表於「美國軍火清單」（U.S. Munitions List）之中，總計有手槍等 21 項類別，一旦軍火交易中有表列物資項目，就要提出許可申請。此一清單也同時包含「多邊飛彈技術管制體制」的技術控制事項。依據 AECE 規定，**中國被列為武器**

禁運的國家之一，迄今仍未除名。

此外，「貿易及競爭力綜合法案」（The Omnibus Trade and Competitiveness Act of 1988）就本國公司面臨國外併購且影響國家安全時，授權總統得以介入或禁止；「經濟間諜法案」（Economic Espionage Act of 1996），則在防堵國外集團竊取美國公司商業機密。

四、國際出口管制架構

一、多邊出口管制協調委員會

國際出口管制主要指，1949 年由美國、日本及大部分「北大西洋公約組織」(North Atlantic Treaty Organization，簡稱北約)國家，計 16 國所架構的「多邊出口管制協調委員會」（Coordinating Committee on Mulilateral Export Controls, COCOM），該委員會成為國際間出口管制的濫觴，也是歐洲執行出口管制的源起制度。在此架構內，各國可基於安全因素，投票反對其他國的出口案件，其目的除對當時蘇聯及全球共黨政權展開政治及軍事圍堵之外，更為防範軍事物資及高科技產品與技術流入蘇聯及其盟國，它監控約 120 類原子能武器及軍火物資，**監控國家包含中國在內**。該協調委員雖依賴各國相互間的信守，沒有強制力，但在冷戰氛圍下，確能發揮一定效能。不過，由於管制事項往往與各國國內管制項目或標準不同，甚至基於國家利益也有同一國家的不同交易中審核標準不一的情形發生，以致參與國間常引發

爭執。

隨著冷戰結束，COCOM 於 1993 年效力終止，但為維持國際出口管制的適當架構，經過二年多談判，在 1996 年訂定「瓦森納協定」（Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies），目前計有 33 國加入協定，其管制清單類別計有九項，與美國分類相近。依據該協定，參與國同意就軍用科技與通用科技實施出口管制。但不同於 COCOM，在瓦森納協定下，是由參與國自行實施出口管制，他國不再擁有置喙權。惟另以「敏感清單」（如附錄 4）與「非常敏管清單」（如附錄 5）對管制品項加以特別註明。依據該協定，**中國已非管制對象國**。

二、國際軍備出口管制

除上述國際協定外，另有成立於 1985 年的「澳洲集團」（Australia Group，AG），係針對生化武器相關原物料、設備、技術等進行出口管制；成立於 1987 年的「飛彈技術管制體制」（Missile Technology Control Regime, MTCR），係針對製造火箭、導彈、巡弋飛彈、無人駕駛航空器相關設備、原料、技術等進行出口管制，但它並非正式國際協定；以及「核子供應集團」（Nuclear Suppliers Group, NSG），成立於 1978 年，係針對核子原物料及相關設備進行出口管制，「任格委員會」（Zannger Committee）也處理相同事務。

此外，1972 的「生物武器會議」（Biological Weapons Converntion, BWC）以及 1993 年的「化學武器會議」（Chemical Weapon Convention, CWC）也在禁止發展與移轉生化及有毒武器，但缺乏監管機制，已為「澳洲集團」取代；2004 年成立之「反對導彈擴散國際行為公約」（International Code of Conduct Against Ballistic Missile Proliferation, ICOC），用意在使 111 參與國自主約制飛彈技術需求的行動，並透過國際信心機制，將各國導彈計畫透明化。

三、歐盟武器禁運與出口管制

除上述國際管制外，歐盟本身除於 1989 年對中國實施武器禁運外，也有三項管制規定：1998 年「歐盟武器出口行為準則」（European Code of Conduct on Arms Exports）、2000 年「出口管制共同體體制」（Community Regime for the Control of Exports）、2003 年「武器傳銷管制」（Control of Arms Brokering）。

「歐盟武器出口行為準則」是共同外交暨安全政策的正式文件，它是一種傳統武器出口管制的多邊機制（regime），致力於阻止武器出口被用於國內鎮壓或國際侵略，以及促成區域不穩定，它由指導原則與管控規定兩個部分構成。其中指導原則特別禁止武器之銷售、出口、移轉導致嚴重破壞人權、對抗歐盟盟邦和友邦、支持恐怖活動、不友好的二次移轉、逆轉工程破解風險以及危害地區和平、安

全與穩定。其主要管控機制在會員國定期相互間公開武器出口和執行行為準則的情形，以增強歐盟國家武器出口的透明性。

伍、對中國技術出口之擴張

各國對中國技術出口的不斷擴張，自然與中國的改革開放、中國對外關係的改變、以及中國在國際政治與經濟地位的顯著提升有重大關聯，這些因素也就顯示在國際出口管制的變遷之上。可以說，國際間對於中國高科技出口擴張，相當程度受到國際經貿利益的驅使，因此其成長動力，一方面源自中國急切地期望藉由技術引進加速現代化進程，一方面源自中國龐大的市場誘因，使各國廠商無法抗拒。

一、歐洲對中國出口管制的變遷

自 1981 年起，COCOM 放寬對中國的管制，到 80 年代中，各國與中國間的出口審查案件申請已大量增加，對於中國的物資出口申請也因此最容易引發各國間的貿易摩擦，其中尤以擁有高技術水準廠商的西歐及美國間的爭執最為嚴重。

然究其實，美國自 80 年代迄今，對中國出口開放才是帶動國際對中國科技出口放寬的主因。在 1985 年美國政府審查的對中國出口案件已超過一萬件，是 1982 年的十倍，美國呈送 COCOM 審查的出口中國案件，也占其總申請數 95%。而隨著蘇聯解體，美國的國際領導地位愈為穩固，因此就長期而言，美國對中國出口物資的政策詮釋

在很大程度影響了國際對中國科技出口的走向。

既然逐步開放是以美國為主西方國家對中國出口管制的趨勢，此一趨勢便足以刺激各國以其自身的不同利益，調整對中國的出口管制政策，這使得原有國際管制愈趨鬆散。因此，即便有前述瓦森納協定等國際間的約定，仍無法完全抑制軍品及通用物資在國際間的流動。就中國而言，俄羅斯即是一個重要的武器提供國。90 年代俄羅斯每年出口武器約 12 億美元，這數字到 1999 年後增加二倍，2004 年約 23 到 26 億美元。

有鑒於國際通用科技出口擴張，1999 年美國建議瓦森納協定做更為嚴謹的管控，例如以出口個案報告替代總計報告、以總額品項報告替代敏感出口單項報告，以及強化出口前報告等，但均為俄羅斯及烏克蘭所反對。由於，缺乏出口前報告、缺乏審查一致原則（no-undercut rule）、以及缺乏有效的限制出口措施，限制了瓦森納協定的效力。

歐盟方面的武器禁運與出口管制成效也未見樂觀。觀察家 Thijs Papot 將歐盟對中國武器禁運稱之為「象徵性工具」。依據現有公佈資料，歐盟於 2002 年武器相關出口許可金額已達 2.75 億美元，2003 更達 4.16 億美元，其中以法國、英國、義大利、德國為大宗。

根據與解放軍關係密切的香港「廣角鏡」一篇文章顯示，中國從歐洲引進軍事相關物資，並無意於藉此增進其載台或武器功能，其主

要目的在於技術移轉、合作與共同開發，以改進中國落後的傳統武器技術，中國對歐洲最感興趣的技術包含：法國飛彈技術，德國潛艇技術，英國的引擎技術，以及先進電子與資訊技術、飛彈導航、感測、雷射、伽利略衛星導航技術、隱形技術。中國最終目的在透過這些採購，以策進研發，提升國內的國防工業水準。

二、美國對中國出口管制的變遷

國際間管控的弱點，使得各國敏感科技出口步調產生不協調，這對於美國這一全球最大經濟體而言，造成極大的貿易壓力，這壓力尤其顯示在美國廠商對於聯邦政府出口管制的不滿。

二戰以來，美國對中國出口權限一直朝著放寬的趨勢演進。在韓戰時期，美國將中國列為「Z」等級國家，進行完全的禁運。1972 中美關係逐漸解凍，對中國評等改為「Y」與蘇聯共產集團相同。到了 1980 年卡特總統訂定特別的評等「P」，自此不准輸出蘇聯的通用技術被同意出口至中國，1982 年美國輸出中國 20 億美元物資，其中的技術層級逐漸提高，農產比例逐漸下滑。1983 年中國評等升為「V」，與美國的北約盟國同級，這也帶動美國對中國出口急速增加，1985 年核准出口案件 8,593 件，幾乎為 1981 年的六倍，美國政府並將占出口許可申請案件 75%的物品類別列為「綠色區」，以加速許可作業，這些品項計有：電腦、電腦化工具、微電路、電子器具、錄音器具、

半導體產品、示波器。

此一趨勢在天安門事件後，美國對中國進行武器禁運而稍有緩歇，但在之後的整個 90 年代，美國對中國貿易出口開放趨勢再度上揚。1998 年美國出口中國物資超過 140 億元，1999 年計有 1,213 個通用科技出口許可申請案件，價值約 13.7 億美元。這一數字雖在美國總體出口數據來說並不大，但對電腦、機具與航空業來說仍屬重要。

到了 90 年代末，美國政府、廠商、與專家之間，產生二個相左的看法，一方面有人認為基於國家安全與利益，以及與友邦間的出口管制政策的一致性，應該嚴格管制對中國通用科技的輸出，否則美國所輸出的技術，最後將被用來對付美國。而另一方面，尤其是工業界，卻認為在當前國際出口管制缺乏合作一致的情形下，美國對中國及其他管制地區的出口限制與遲緩已造成美國重大的貿易損失，且對國家安全並未發生任何助益，例如中國已不再向美國廠商發放招標書，而向歐洲尋求採購與技術移轉。美國出口管制應放寬考量「國外可獲得性」（foreign availability）與「大量市場特徵」（mass market characteristics）[1]。廠商認為維繫美軍優質軍備主要原因在於仰賴民間的技術與研發，出口限制將扼殺美國廠商生存空間，進而威脅美國國防武器技術的提升。

[1] 一項出口物資具有大量市場特徵，是指該品項在國際市場被大量拋售或有許多買者，或是具有廣泛的流通網路，或是可以一般方式運送，或是可以經小幅度修改做爲特定意圖使用。

反對者認為面對國際出口的鬆弛，美國開放出口將使情況惡化，危及美國的技術領導地位與國家安全，正確的做法是促進國際嚴謹與一致的管制架構。因此，如何使出口管制在中國市場保有率與美國家安全保障間做精確平衡，成為美國商業部的挑戰。

陸、中國的技術移轉策略

中國除了依循正常管道，大量增加對美國的技術引進的需求外，最引人注目的是，中國透過國際市場所採取的迂迴移轉管道。根據美國眾議院寇克斯委員會（Cox Commission）在 1999 年的調查，中國迴避出口管制，非法地獲取飛彈設計與衛星技術，並迴避了終端使用者管制，獲取美國廠商的高功能電腦。

問題是，中國是如何突破上述多重出口管制的？是美國對中國的技術輸出管制存在漏洞嗎？實則，中國敏感技術獲取很大一部分來自研究機構與私人企業，而非情報單位，這些非專業情報人員包含學生、科學家、研究員、以及參訪人員，這些人員或單位均獨立於情報專業之外進行高科技蒐集，這也使得一般反情報手段無法徵別中國所移轉的技術是否危及國際安全。

根據寇克斯報告，中國所運用主要技術移轉策略有：

1. 利用「太子黨」與中國共產黨及人民解放軍在政、軍、商的關係，向國外購買武器。

2. 非法從第三國引進美國軍事科技。

3. 向美國廠商施壓，藉由非法創投移轉可釋出（licensable）技術。

4. 以不可預見的方法開發具軍事優勢的產品與服務。

5. 以不合法方式將可釋出通用技術轉為軍事用途。

6. 使用人頭公司非法獲取技術。

7. 運用貿易公司與其他組織掩護技術獲得。

8. 在美國技術公司獲取利益。

9. 運用獨立於情報單位之外的政府部門、委員會、研究機構、軍事企業的人員擔任秘密間諜活動。

此外，中國也設法蒐訪可以接觸敏感資訊的美國亞裔人士，甚至在他們協助下獲取非法技術與資訊。最後，中國也能善用美國在過剩軍事技術銷售與工業拍賣出口監控的漏洞，趁機獲取有用的技術。

柒、結論

一般瞭解，中國自 80 年代末期，在鄧小平領導下啟動「863」計畫，加速科學與技術的採購與發展，縮小中國與西方先進國家間的技術差距，其中當然也包含戰略軍事技術，亦即太空技術、資訊技術、雷射技術、自動化技術、能源技術、以及新材料等。1996 年中國再發起「超 863」計畫，以持續技術發展計畫，態度極為積極，甚至強調設立足以吸引美國研究人員的相關科研計畫。1997 年中共提出所

謂十六字箴言：「軍民結合，平戰結合，軍品優先，以民養軍」，充分顯示其科技發展的主軸仍在軍備的提升與發展。

可見，對中國而言，無論是民間或軍事技術均為其全力引進的對象，目的即在提升其整體經濟結構。而中國所推動的分散且多元滲透的技術獲得策略，使得西方國家無從防範，因為一般性技術蒐集機制與組織正是其用以蒐集軍事技術的管道。再加上國際出口管制成效不彰，中國市場貿易機會陡升，國際軍火市場競爭激烈，其結果使中國得以從歐美國家獲取相當可觀的先進技術，不僅有助於其整體的技術提升，更增進其傳統精密武器的製造水準，從而引發國際敏感技術擴散與危及區域安全的憂慮。

這種基於中國軍事技術升級所引發的安全威脅意識，正是歐美二方認知差距的主因。儘管西方國家均瞭解對中國技術輸出可能引致軍事技術優勢的喪失，但中國廣大的市場誘因與冷戰後軍火市場的萎縮，使得美國或歐洲國家均傾向開放與中國的技術貿易。也因此，歐美對於中國武器禁運的歧見，其實也是軍火貿易競爭的延續，不表示歐美與中國間的關係有實質的改變。

不過，持續擴大對中國技術出口的寬鬆與不一致，對台海安全情勢將構成影響。台灣面對中國積極拓展國際技術移轉，至少應有以下二種因應作為。首先應積極掌握中國技術移轉的策略與進展，持續在

國際上強調其可能的負面效應。其二應以敵為師，整備我國通用科技的政策與策略管理，強化我國通用技術發展體質。當然，為確保與友邦的情誼，我國不宜以非法或扭曲手段蒐集外國技術，同時基於台灣技術需求規模較小，投入技術移轉資源有限，亦無法如中國採取以量取勝、明暗並施的移轉策略。也因此，我國應積極透過更嚴整精密的管理手段，集中資源，發展重點，營造利基，吸引國外投資，開拓合作機會，以持續提升我國通用技術水準，確保我國軍事科技發展的相對自主。

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Commerce Country Chart

Reason for Control

Countries	Chemical & Biological Weapons			Nuclear Nonproliferation		National Security		Missile Tech	Regional Stability		Firearms Convention	Crime Control			Anti-Terrorism	
	CB 1	CB 2	CB 3	NP 1	NP 2	NS 1	NS 2	MT 1	RS 1	RS 2	FC 1	CC 1	CC 2	CC 3	AT 1	AT 2
Burma	X	X	X	X		X	X	X	X	X		X		X		
Burundi	X	X		X		X	X	X	X	X		X		X		
Cambodia	X	X		X		X	X	X	X	X		X	X			
Cameroon	X	X		X		X	X	X	X	X		X		X		
Canada	X										X					
Cape Verde	X	X		X		X	X	X	X	X		X		X		
Central African Republic	X	X		X		X	X	X	X	X		X		X		
Chad	X	X		X		X	X	X	X	X		X		X		
Chile	X	X		X		X	X	X	X	X	X	X		X		
China	X	X	X	X		X	X	X	X	X		X		X		
Colombia	X	X		X		X	X	X	X	X	X	X		X		
Comoros	X	X		X		X	X	X	X	X		X		X		
Congo (Democratic Republic of the)	X	X		X		X	X	X	X	X		X		X		

Commerce Country Chart

Reason for Control

Countries	Chemical & Biological Weapons			Nuclear Nonproliferation		National Security		Missile Tech	Regional Stability		Firearms Convention	Crime Control			Anti-Terrorism	
	CB 1	CB 2	CB 3	NP 1	NP 2	NS 1	NS 2	MT 1	RS 1	RS 2	FC 1	CC 1	CC 2	CC 3	AT 1	AT 2
Sudan	X	X		X		X	X	X	X	X		X		X	X	X
Suriname	X	X		X		X	X	X	X	X	X	X		X		
Swaziland	X	X		X		X	X	X	X	X		X		X		
Sweden	X					X		X	X	X		X		X		
Switzerland	X					X		X	X	X		X		X		
Syria	X	X	X	X		X	X	X	X	X		X		X	X	
Taiwan	X	X	X	X		X	X	X	X	X		X		X		
Tajikistan	X	X	X	X		X	X	X	X	X		X	X			
Tanzania	X	X		X		X	X	X	X	X		X		X		
Thailand	X	X		X		X	X	X	X	X		X		X		
Togo	X	X		X		X	X	X	X	X		X		X		
Tonga	X	X		X		X	X	X	X	X		X		X		
Trinidad & Tobago	X	X		X		X	X	X	X	X	X	X		X		
Tunisia	X	X		X		X	X	X	X	X		X		X		

Country Group B

Countries

Afghanistan
Algeria
Andorra
Angola
Antigua and Barbuda
Argentina
Aruba
Australia
Austria
The Bahamas
Bahrain
Bangladesh
Barbados
Belgium
Belize
Benin
Bhutan
Bolivia
Bosnia & Herzegovina
Botswana
Brazil
Brunei
Burkina Faso
Burma
Burundi
Cameroon
Canada
Cape Verde
Central African Republic
Chad
Chile
Colombia
Comoros
Congo (Democratic Republic of the)
Congo (Republic of the)
Costa Rica
Cote d'Ivoire
Croatia
Cyprus
Czech Republic
Denmark
Djibouti
Dominica
Dominican Republic
East Timor
Ecuador
Egypt
El Salvador
Equatorial Guinea
Eritrea
Ethiopia
Fiji
Finland
France
Gabon
Gambia, The
Germany
Ghana
Greece
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Ireland
Israel
Italy
Jamaica
Japan
Jordan
Kenya
Kiribati
Korea, South
Kuwait
Lebanon
Lesotho
Liberia
Liechtenstein
Luxembourg
Macedonia, The Former Yugoslav Republic of
Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Marshall Islands
Mauritania
Mauritius
Mexico
Micronesia, Federated States of
Monaco
Morocco
Mozambique
Namibia
Nauru
Nepal
Netherlands
Netherlands Antilles
New Zealand
Nicaragua
Niger
Nigeria
Norway
Oman
Pakistan
Palau
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Rwanda
Saint Kitts & Nevis
Saint Lucia
Saint Vincent and the Grenadines
Samoa
San Marino
Sao Tome & Principe
Saudi Arabia
Senegal
Serbia and Montenegro
Seychelles
Sierra Leone
Singapore
Slovakia
Slovenia
Solomon Islands
Somalia
South Africa
Spain
Sri Lanka
Surinam
Swaziland
Sweden
Switzerland
Taiwan
Tanzania
Thailand
Togo
Tonga
Trinidad & Tobago

Country Group D

Country	[D: 1] National Security	[D: 2] Nuclear	[D: 3] Chemical & Biological	[D: 4] Missile Technology
Afghanistan			X	
Albania	X			
Armenia	X		X	
Azerbaijan	X		X	
Bahrain			X	X
Belarus	X		X	
Bulgaria	X			
Burma			X	
Cambodia	X			
China (PRC)	X		X	X
Cuba		X	X	
Egypt			X	X
Estonia	X			
Georgia	X		X	
India		X	X	X
Iran		X	X	X
Iraq	X	X	X	X
Israel		X	X	X
Jordan			X	X
Kazakhstan	X		X	
Korea, North	X	X	X	X
Kuwait			X	X
Kyrgyzstan	X		X	
Laos	X			
Latvia	X			
Lebanon			X	X
Libya		X	X	X
Lithuania	X			
Macau	X		X	X
Moldova	X		X	
Mongolia	X		X	

Supplement No. 4 to Part 744 - ENTITY LIST

This Supplement lists certain entities subject to license requirements for specified items under this part 744 of the EAR. License requirements for these entities includes exports and reexports, unless otherwise stated. This list of entities is revised and updated on a periodic basis in this Supplement by adding new or amended notifications and deleting notifications no longer in effect.

COUNTRY	ENTITY	LICENSE REQUIREMENT	LICENSE REVIEW POLICY	FEDERAL REGISTER CITATION
●CHINA, PEOPLE'S REPUBLIC OF	13 Institute, China Academy of Launch Vehicle Technology, (CALT), a.k.a. 713 Institute or Beijing Institute of Control Devices	For all items subject to the EAR.	See §744.3(d) of this part.	66 FR 24265 5/14/01
	33 Institute, a.k.a. Beijing Institute of Automatic Control Equipment	For all items subject to the EAR having a classification other than EAR99 or a classification where the third through fifth digits of the ECCN are "999", e.g., XX999.	See §744.3(d) of this part.	66 FR 24266 5/14/01
	35 Institute, a.k.a. Beijing Huahang Radio Measurements Research Institute	For all items subject to the EAR having a classification other than EAR99 or a classification where the third through fifth digits of the ECCN are "999", e.g., XX999.	See §744.3(d) of this part.	66 FR 24266 5/14/01

COUNTRY	ENTITY	LICENSE REQUIREMENT	LICENSE REVIEW POLICY	FEDERAL REGISTER CITATION
	54th Research Institute of China, a.k.a. Communication, Telemetry and Telecontrol Research Institute (CTI)	For all items subject to the EAR having a classification other than EAR99 or a classification where the third through fifth digits of the ECCN are "999", e.g., XX999.	See §744.3(d) of this part.	66 FR 24266 5/14/01
	Baotou Guanghua Chemical Industrial Corporation, 202 Factory Baotou, Inner Mongolia	For all items subject to the EAR having a classification other than EAR99.	See §744.2(d) of this part.	66 FR 24266 5/14/01
	Beijing Aerospace Automatic Control Institute, 51 Yong Ding Road Beijing	For all items subject to the EAR having a classification other than EAR99.	See §744.3 of this part.	64 FR 28909 5/28/99
	Beijing Institute of Structure and Environmental Engineering, a.k.a., Beijing Institute of Strength and Environmental Engineering, No. 36 Wanyuan Road Beijing	For all items subject to the EAR having a classification other than EAR99.	See §744.3 of this part.	64 FR 28909 5/28/99
	Beijing Power Machinery Institute	For all items subject to the EAR.	See §744.3(d) of this part.	66 FR 24266 5/14/01
	●Beijing University of Aeronautics and Astronautics (BUAA), a.k.a. Beihang University	For all items subject to the EAR.	See §744.3(d) of this part.	66 FR 24266 5/14/01 70 FR 54629 9/16/05

COUNTRY	ENTITY	LICENSE REQUIREMENT	LICENSE REVIEW POLICY	FEDERAL REGISTER CITATION
	China Aerodynamics Research and Development Center (CARDC) Sichuan Province	For all items subject to the EAR having a classification other than EAR99.	See §744.3 of this part.	64 FR 28909 5/28/99
	Chinese Academy of Engineering Physics (a.k.a. Ninth Academy, including the Southwest Institutes of: Applied Electronics, Chemical Materials, Electronic Engineering, Explosives and Chemical Engineering, Environmental Testing, Fluid Physics, General Designing and Assembly, Machining Technology, Materials, Nuclear Physics and Chemistry (a.k.a. China Academy of Eng[ineering] Physics [CAEP]'s 902 Institute, Mianyang), Structural Mechanics; Research and Applications of Special Materials Factory; Southwest Computing Center (all of preceding located in or near Mianyang, Sichuan Province); Institute of Applied Physics and Computational Mathematics, Beijing; and High Power Laser Laboratory, Shanghai)	For all items subject to the EAR.	Case-by-case basis.	62 FR 35334 6/30/97 66 FR 24266 5/14/01
	First Department, China Academy of Launch Vehicle Technology, (CALT)	For all items subject to the EAR.	See §744.3(d) of this part.	66 FR 24266 5/14/01
	Northwest Institute of Nuclear Technology, in the Science Research, Xi'an, Shaanxi	For all items subject to the EAR.	See §744.2 of this part.	64 FR28909 5/28/99

COUNTRY	ENTITY	LICENSE REQUIREMENT	LICENSE REVIEW POLICY	FEDERAL REGISTER CITATION
	Northwestern Polytechnical University	For all items subject to the EAR having a classification other than EAR99 or a classification where the third through fifth digits of the ECCN are "999", e.g., XX999.	See §744.3(d) of this part.	66 FR 24266 5/14/01
	Shanghai Academy of Spaceflight Technology, Shanghai, Spaceflight Tower 222 Cao Xi Road Shanghai, 20023	For all items subject to the EAR having a classification other than EAR99.	See §744.3 of this part.	64 FR 28909 5/28/99
	Shanghai Institute of Space Power-Sources, Shangahi, 388 Cang Wu Rd Shanghai	For all items subject to the EAR having a classification other than EAR99.	See §744.3 of this part.	64 FR 28909 5/28/99
	Southwest Research Institute of Electronics Technology, Chengdu	For all items subject to the EAR having a classification other than EAR99 or a classification where the third through fifth digits of the ECCN are "999", e.g., XX999.	See §744.3(d) of this part.	66 FR 24267 5/14/01
	Xian Research Institute of Navigation Technology	For all items subject to the EAR having a classification other than EAR99.	See §744.3(d) of this part.	66 FR 24267 5/14/01

COUNTRY	ENTITY	LICENSE REQUIREMENT	LICENSE REVIEW POLICY	FEDERAL REGISTER CITATION
	Xiangdong Machinery Factory	For all items subject to the EAR.	See §744.3(d) of this part.	66 FR 24267 5/14/01
INDIA	Bharat Dynamics Limited	For all items subject to the EAR.	Case-by-case for all items listed on the CCL. Presumption of approval for EAR99 items.	63 FR 64322 11/19/98 65 FR 14444 03/17/00 66 FR 50090 10/01/01
	The following subordinates of **Defense Research and Development Organization** (DRDO): Armament Research and Development Establishment (ARDE) Defense Research and Development Lab (DRDL), Hyderabad Missile Research and Development Complex Solid State Physics Laboratory	For all items subject to the EAR.	Case-by-case for all items listed on the CCL. Presumption of approval for EAR99 items.	63 FR 64322 11/19/98 65 FR 14444 03/17/00 66 FR 50090 10/01/01

THE SENSITIVE LIST OF DUAL-USE GOODS AND TECHNOLOGIES

N.B. *Where abbreviated entries are used, see the List of Dual-Use Goods and Technologies for full details. Text that differs from that in the List of Dual-Use Goods and Technologies is shaded.*

Category 1

1.A.2.	"Composite" structures or laminates...
1.C.1.	Materials specially designed for use as absorbers of electromagnetic waves...
1.C.7.c. & 1.C.7.d.	Ceramic-ceramic "composite" materials...
1.C.10.c. & 1.C.10.d.	Fibrous or filamentary materials...
1.C.12.	Materials as follows...
1.D. 2	"Software" for the "development" of organic "matrix", metal "matrix" or carbon "matrix" laminates or "composites" listed on this List.
1.E.1.	"Technology" according to the General Technology Note for the "development" or "production" of equipment and materials in 1.A.2. or 1.C. of this List.
1.E. 2.e. & 1.E.2.f.	Other "technology"...

Category 2

2.B.1.a.	Deleted
2.B.1.b.	Deleted
2.B.1.d.	Deleted
2.B.1.f.	Deleted
2.B.3.	Deleted
2.D.1.	"Software", other than that controlled by 2.D.2., specially designed for the "development" or "production" of the following equipment:

a. Machine tools for turning, having all of the following characteristics:
   1. Positioning accuracy with "all compensations available" equal to or less (better) than 3.6 μm according to ISO 230/2 (1997) or national equivalents along any linear axis; and
   2. Two or more axes which can be coordinated simultaneously for "contouring control".

Category 2 contd.

2.D.1.

b. Machine tools for milling, having any of the following characteristics:
   1.a. Positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; and
   b. Three linear axes plus one rotary axis which can be coordinated simultaneously for "contouring control";

   2. Five or more axes which can be coordinated simultaneously for "contouring control" and have a positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; or

   3. A positioning accuracy for jig boring machines, with "all compensations available", equal to or less (better) than 3 µm according to ISO 230/2 (1997) or national equivalents along any linear axis;

c. Electrical discharge machines (EDM)....

d. Deep-hole-drilling machines....

e. "Numerically controlled" or manual machine tools...

2.E.1.

"Technology" according to the General Technology Note for the "development" of "software" in 2.D. of this List or for the "development" of the following equipment:

a. Machine tools for turning, having all of the following characteristics:
   1. Positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; and
   2. Two or more axes which can be coordinated simultaneously for "contouring control".

Category 2 contd.

2.E.1.

b. Machine tools for milling, having any of the following characteristics:
   1.a. Positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; and
   b. Three linear axes plus one rotary axis which can be coordinated simultaneously for "contouring control";

   2. Five or more axes which can be coordinated simultaneously for "contouring control" and have a positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; or

   3. A positioning accuracy for jig boring machines, with "all compensations available", equal to or less (better) than 3 µm according to ISO 230/2 (1997) or national equivalents along any linear axis;

c. Electrical discharge machines (EDM)....

d. Deep-hole-drilling machines....

e. "Numerically controlled" or manual machine tools...

2.E.2.

"Technology" according to the General Technology Note for the "production" of the following equipment:

a. Machine tools for turning, having all of the following characteristics:
   1. Positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; and
   2. Two or more axes which can be coordinated simultaneously for "contouring control".

Category 2 contd.

2.E.2.

b. Machine tools for milling, having any of the following characteristics:

1.a. Positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; and

b. Three linear axes plus one rotary axis which can be coordinated simultaneously for "contouring control"; or

2. Five or more axes which can be coordinated simultaneously for "contouring control" and have a positioning accuracy with "all compensations available" equal to or less (better) than 3.6 µm according to ISO 230/2 (1997) or national equivalents along any linear axis; or

3. A positioning accuracy for jig boring machines, with "all compensations available", equal to or less (better) than 3 µm according to ISO 230/2 (1997) or national equivalents along any linear axis;

c. Electrical discharge machines (EDM)....

d. Deep-hole-drilling machines....

e. "Numerically controlled" or manual machine tools...

Category 3

3.A.2.g.2. Atomic frequency standards....

3.B.1.a.2. Metal organic chemical vapour deposition reactors....

3.D.1. "Software" specially designed for the "development" or "production" of equipment in 3.A.2.g. or 3.B. of this List.

3.E.1. "Technology" according to the General Technology Note for the "development" or "production" of equipment in 3.A. or 3.B. of this List.

Category 4

4.A.1.a.2.	Electronic computers.....radiation hardened;
4.A.3.b.	Deleted
4.A.3.c.	Deleted
4.D.1.	"Software" specially designed for the "development" or "production" of equipment in 4.A. of this List or for the "development" or "production" of "digital computers" having a "composite theoretical performance" ("CTP") exceeding 190,000 Mtops.
4.E.1.	"Technology" according to the General Technology Note for the "development" or "production" of the following equipment or "software": - Equipment in 4.A. of this List; - "Digital computers" having a "composite theoretical performance" ("CTP") exceeding 190,000 Mtops; or - "Software" in 4.D. of this List.

Category 5 - Part 1

5.A.1.b.3.	Being radio equipment .....
5.A.1.b.5.	Being digitally controlled radio receivers...
5.B.1.a.	Equipment and specially designed components or accessories therefor, specially designed for the "development", "production" or "use" of equipment, functions or features in Category 5 - Part 1 of this List.
5.D.1.a.	"Software" specially designed for the "development" or "production" of equipment, functions or features in Category 5 - Part 1 of this List.
5.D.1.b.	"Software" specially designed or modified to support "technology" listed under 5.E.1. of this List.
5.E.1.a.	"Technology" according to the General Technology Note for the "development" or "production" of equipment, functions, features or "software" in Category 5 - Part 1 of this List.

Category 5 - Part 2 - None

Category 6

6.A.1.a.1.b.	Object detection or location systems having any of the following: 1. A transmitting frequency below 5 kHz or a sound pressure level exceeding 224 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 5 kHz to 10 kHz inclusive; 2. Sound pressure level exceeding 224 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive; 3. Sound pressure level…; 4. Forming beams of …; 5. Designed to operate… 6. Designed to withstand…;
6.A.1.a.2.a.1.	Hydrophones...Incorporating…
6.A.1.a.2.a.2.	Hydrophones...Having any…
6.A.1.a.2.a.4.	Hydrophones...When designed...
6.A.1.a.2.a.5.	Hydrophones...Designed for...
6.A.1.a.2.b.	Towed acoustic hydrophone arrays...
6.A.1.a.2.c.	Processing equipment, specially designed for real time application with towed acoustic hydrophone arrays, having "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;
6.A.1.a.2.d.	Heading sensors....
6.A.1.a.2.e.	Bottom or bay cable systems having any of the following: 1. Incorporating hydrophones... or 2. Incorporating multiplexed hydrophone group signal modules…;
6.A.1.a.2.f.	Processing equipment, specially designed for real time application with bottom or bay cable systems, having "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;
6.A.2.a.1.a., b., and c.	"Space-qualified" solid-state detectors...

Category 6 contd.

6.A.2.a.2.a. Image intensifier tubes ...

1. A peak response…
2. A microchannel plate…
3. Photocathodes, as follows:
   a. S-20, S-25 or multialkali photocathodes with a luminous sensitivity exceeding 700 μA/lm;
   b. GaAs or GaInAs photocathodes;
   c. Other III-V compound semiconductor photocathodes.

6.A.2.a.3. Non-space qualified "focal plane arrays"…;

Note 3

In 6.A.2.a.3. the following "focal plane arrays" are not included in this List:

a. Platinum Silicide (PtSi) "focal plane arrays" having less than 10,000 elements;

b. Iridium Silicide (IrSi) "focal plane arrays".

Note 4

In 6.A.2.a.3. the following "focal plane arrays" are not included in this List:

a. Indium Antimonide (InSb) or Lead Selenide (PbSe) "focal plane arrays" having less than 256 elements;

b. Indium Arsenide (InAs) "focal plane arrays";

c. Lead Sulphide (PbS) "focal plane arrays";

d. Indium Gallium Arsenide (InGaAs) "focal plane arrays".

Note 5

In 6.A.2.a.3. Mercury Cadmium Telluride (HgCdTe) "focal plane arrays" as follows are not included in this List:

a. Scanning Arrays having any of the following:

1. 30 elements or less; or

2. Incorporating time delay-and-integration within the element and having 2 elements or less;

b. Staring Arrays having less than 256 elements.

Technical Notes

1. 'Scanning Arrays' are defined as "focal plane arrays" designed for use with a scanning optical system that images a scene in a sequential manner to produce an image;

2. 'Staring Arrays' are defined as "focal plane arrays" designed for use with a non-scanning optical system that images a scene.

Category 6 contd.

6.A.2.a.3.

Note 6
In 6.A.2.a.3. the following "focal plane arrays" are not included in this List:

a. Gallium Arsenide (GaAs) or Gallium Aluminum Arsenide (GaAlAs) quantum well "focal plane arrays" having less than 256 elements;

b. Microbolometer "focal plane arrays" having less than 8,000 elements.

6.A.2.b. "Monospectral imaging sensors" and "multispectral imaging sensors"....

6.A.2.c. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating any of the following:

1. Image intensifier tubes having the characteristics listed in 6.A.2.a.2.a. of this List; or
2. "Focal plane arrays" having the characteristics listed in 6.A.2.a.3. of this List;

6.A.2.e. "Space-qualified" "focal plane arrays"....

6.A.3.b.3. Imaging cameras incorporating image intensifier tubes having the characteristics listed in 6.A.2.a.2.a. of this List;

6.A.3.b.4. Imaging cameras incorporating "focal plane arrays" having any of the following:

a. Incorporating "focal plane arrays" listed in 6.A.2.a.3.a. to 6.A.2.a.3.e. of this List; or

b. Incorporating "focal plane arrays" listed in 6.A.2.a.3.f. of this List

Note 1 *'Imaging cameras' described in 6.A.3.b.4 include "focal plane arrays" combined with sufficient signal processing electronics, beyond the read out integrated circuit, to enable as a minimum the output of an analogue or digital signal once power is supplied.*

Note 2 *6.A.3.b.4.a. does not control imaging cameras incorporating linear "focal plane arrays" with twelve elements or fewer, not employing time-delay-and-integration within the element, designed for any of the following:*

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

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

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

d. Equipment specially designed for laboratory use; or

e. Medical equipment.

Category 6 contd.

6.A.3.b.4. contd. *Note 3* *6.A.3.b.4.b. does not control imaging cameras having any of the following characteristics:*

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

b. Having all of the following:

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

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

3. Not incorporating a direct view display; and
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.

4. Having any of the following:

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

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

Technical Note
Instantaneous Field of View (IFOV) specified in Note 3.b. is the lesser figure of the Horizontal FOV or the Vertical FOV.
Horizontal IFOV = horizontal Field of View (FOV)/number of horizontal detector elements
Vertical IFOV= vertical Field of View (FOV)/number of vertical detector elements.

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

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

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

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

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

Note: When necessary, details of the item will be provided, upon request, to the appropriate authority in the exporter's country in order to ascertain compliance with the conditions described in Note 3.b.4. and Note 3.c. above.

Category 6 contd.

6.A.4.c.	"Space-qualified" components for optical systems....
6.A.4.d.	Optical control equipment.....
6.A.6.a.	"Magnetometers" ... using optically pumped or nuclear precession (proton/Overhauser) having a "noise level" (sensitivity) lower (better) than 2 pT rms per square root Hz.
6.A.6.g.	Magnetic compensation systems...
	Note *In 6.A.6.g. those compensators which provide only absolute values of the earth's magnetic field as output, (i.e., the frequency bandwidth of the output extends from DC to at least 0.8 Hz) are not included in this List.*
6.A.6.h.	"Superconductive" electromagnetic sensors.....
6.A.8.d.	Radar systems.....Capable of…
6.A.8.h.	Radar systems…Employing processing
6.A.8.k.	Radar systems…Having "signal processing"…
6.A.8.l.3.	Radar systems…Having data processing… Processing for…
6.B.8.	Pulse radar cross-section…
6.D.1.	"Software" specially designed for the "development" or "production" of equipment in 6.A.4., 6.A.8. or 6.B.8. of this List.
6.D.3.a.	"Software", as follows:…
6.E.1.	"Technology" according to…
6.E.2.	"Technology" according to the General Technology Note for the "production" of equipment in 6.A. or 6.B. of this List.

Category 7

7.D.2.	"Source code" for the "use"…
7.D.3.a.	"Software" specially designed or modified to…
7.D.3.b.	"Source code" for…
7.D.3.c.	"Source code" for…
7.D.3.d.1. to 4. & 7.	"Source code" for the "development" of…
7.E.1. & 7.E.2.	"Technology" according to the General Technology Note...

Category 8

8.A.1.b.	Manned, untethered submersible vehicles…
8.A.1.c.	Unmanned, tethered submersible vehicles.....
8.A.1.d.	Unmanned, untethered submersible vehicles...

Category 8 contd.

8.A.2.b.	Systems specially designed or modified for the automated control of the motion of submersible vehicles in 8.A.1. of this List using navigation data and having closed loop servo-controls: 1. Enabling…; 2. Maintaining…; or 3. Maintaining…;
8.A.2.h.	"Robots" specially designed for underwater use.....
8.A.2.j.	Air independent power systems.....
8.A.2.o.3.	Noise reduction systems for use on vessels...
8.A.2.p.	Pumpjet propulsion systems....
8.D.1.	"Software" specially designed for the "development" or "production" of equipment in 8.A. of this List.
8.D.2	Specific "software" **…**
8.E.1.	"Technology" according to the General Technology Note for the "development" or "production" of equipment in 8.A. of this List.
8.E.2.a.	Other "technology".....

Category 9

9.A.11.	Ramjet, scramjet or combined cycle engines...
9.B.1.b.	Ceramic cores or shells
9.D.1.	"Software" specially designed or modified for the "development" of equipment or "technology" in 9.A., 9.B. or 9.E.3. of this List.
9.D.2.	"Software" specially designed or modified for the "production" of equipment in 9.A. or 9.B. of this List.
9.D.4.a.	Other "software"…2D or 3D…
9.D.4.c.	Other "software"…"Software" specially…
9.E.1.	"Technology" according to the General Technology Note.....
9.E.2.	"Technology" according to the General Technology Note…
9.E.3.a.1.	Other "technology"…Gas turbine blades…
9.E.3.a.2. to 5. & 9.E.3.a.8., 9.E.3.a.9.	Other "technology"…

VERY SENSITIVE LIST OF DUAL-USE GOODS AND TECHNOLOGIES

N.B. *Where abbreviated entries are used, see List of Dual-Use Goods and Technologies for full details. Text that differs from that in the List of Dual-Use Goods and Technologies is shaded.*

Category 1

1.A.2.a.	"Composite" structures or laminates having an organic "matrix" and made from materials listed under 1.C.10.c. or 1.C.10.d.
1.C.1.	Materials specially designed for use as absorbers of electromagnetic waves...
1.C.12.	Materials as follows...
1.E.1.	"Technology" according to the General Technology Note for the "development" or "production" of equipment and materials in 1.A.2 or 1.C. of this List.

Category 2 None

Category 3 None

Category 4 None

Category 5 - Part 1

5.A.1.b.5.	Digitally controlled radio receivers...
5.D.1.a.	"Software" specially designed for the "development" or "production" of equipment, functions or features in Category 5, Part 1 of this List.
5.E.1.a.	"Technology" according to the General Technology Note for the "development" or "production" of equipment, functions, features or "software" in Category 5, Part 1 of this List.

Category 5 - Part 2 None

Category 6

6.A.1.a.1.b.1.	Object detection or location systems having a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) and an operating frequency in the band from 30 Hz to 2 kHz.
6.A.1.a.2.a.1.	Hydrophones...Incorporating…
6.A.1.a.2.a.2.	Hydrophones...Having any...
6.A.1.a.2.a.4.	Hydrophones...When designed...
6.A.1.a.2.a.5.	Hydrophones...Designed for...
6.A.1.a.2.b.	Towed acoustic hydrophone arrays...
6.A.1.a.2.c.	Processing equipment, specially designed for real time application with towed acoustic hydrophone arrays, having "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;
6.A.1.a.2.e.	Bottom or bay cable systems having any of the following: 1. Incorporating hydrophones... or 2. Incorporating multiplexed hydrophone group signal modules …;
6.A.1.a.2.f.	Processing equipment, specially designed for real time application with bottom or bay cable systems, having "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;
6.A.2.a.1.c.	"Space-qualified" solid-state detectors...
6.A.8.l.3.	Radar systems…Having data processing… Processing for…
6.B.8.	Pulse radar cross-section…
6.D.1.	"Software" specially designed for the "development" or "production" of equipment in 6.A.8., or 6.B.8. of this List.
6.D.3.a.	"Software", as follows:…
6.E.1.	"Technology" according to the General Technology Note for the "development" of equipment or "software" in 6.A., 6.B., or 6.D. of this List.
6.E.2.	"Technology" according to the General Technology Note for the "production" of equipment in 6.A. or 6.B. of this List.

Category 7

7.D.3.a.	"Software" specially designed or modified to…
7.D.3.b.	"Source code" for…

Category 8

8.A.1.b.	Manned, untethered submersible vehicles...
8.A.1.d.	Unmanned, untethered submersible vehicles...
8.A.2.o.3.b.	Active noise reduction or cancellation systems...
8.D.1.	"Software" specially designed for the "development" or "production" of equipment in 8.A. of this List.
8.E.1.	"Technology" according to the General Technology Note for the "development" or "production" of equipment in 8.A. of this List.

Category 9

9.A.11.	Ramjet, scramjet or combined cycle engines...
9.D.1.	"Software" specially designed or modified for the "development" of equipment or "technology" in 9.A. or 9.E.3. of this List.
9.D.2.	"Software" specially designed or modified for the "production" of equipment in 9.A. of this List.
9.E.1.	"Technology" according to the General Technology Note for the "development" of equipment or "software" in 9.A.11. or 9.D. of this List.
9.E.2.	"Technology" according to the General Technology Note for the "production" of equipment in 9.A.11. of this List.
9.E.3.a.1.	Other "technology"…Gas turbine blades…
9.E.3.a.3.a.	"Technology" "required" for … Components manufactured from... Organic "composite" materials designed to operate above 588 K (315°C).