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**STRENGTHENING THE COUNTER-ILLICIT  
NUCLEAR TRADE REGIME IN THE FACE OF  
NEW THREATS** A TWO-YEAR REVIEW OF PROLIFERATION THREATS  
ASSOCIATED WITH THE MIDDLE EAST

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## OVERVIEW

*The United States' and associated global export control regime is losing ground due to several global events and trends underway in the United States and the Middle East. The developments at home and abroad are reducing controls and oversight over the flow of commodities vital to the development of nuclear weapons. Unless these trends are reversed, U.S. efforts to stem and stop nuclear proliferation in the Middle East and elsewhere will weaken. Events contributing to this greater proliferation danger include: 1) relaxed U.S. export control regulations and greater emphasis on global trade with streamlined exchange of intellectual property and commodities, including nuclear commodities; 2) on-going questions over the strong regulation of sensitive trade to Iran's nuclear and ballistic missile programs; and 3) the expected actions of additional states to obtain nuclear capabilities to counterbalance Iran. This report provides findings from four studies that were part of a two-year Institute for Science and International Security review which identified threats to the United States' and interconnected global export control regime and actions to take now to mitigate damages.*

*The review found that U.S. policy goals should include strong efforts to restrict the flow of sensitive technologies to the Middle East where proliferation and security concerns are currently high. This includes examining its own export control reforms and repairing new or ongoing deficiencies that contribute to the spread of sensitive military or other technologies. It should work to negotiate or otherwise impose the extension of limitations on Iran's nuclear program in the Joint Comprehensive Plan of Action (JCPOA), since the legitimization of Iran's advanced nuclear program exacerbates proliferation concerns. It should counter illicit nuclear and missile trade in the Middle East and elsewhere, which could support nuclear weapons development. The United States should affirm its strong defensive commitment to allies such as Saudi Arabia, the United Arab Emirates (UAE), Turkey, and Egypt, while working against their development or import of advanced fuel cycle capabilities. The United States should also support the implementation of strong controls and transparency measures in the Middle East to ensure that burgeoning civilian nuclear programs remain peaceful, such as commitments not to enrich or reprocess, implementation of the Additional Protocol, and provision of secure, lifetime fuel supplies for nuclear reactors. It should monitor via national intelligence capabilities any concerning research or imports by Middle East nations that could signify proliferation intentions, and use all available diplomatic or coercive means to prevent additional nuclear proliferation. Finally, the United States and its allies should work to reduce Middle East security tensions and develop threat reduction efforts more broadly.*

## **INTRODUCTION**

An effective United States and associated global nuclear export and technology control regime is a key linchpin in efforts to stem and stop nuclear proliferation, particularly in the Middle East. This regime has detected, prevented, or slowed the acquisition of sensitive nuclear and nuclear dual-use technologies by U.S. adversaries. This regime, unless actions are taken now, will degrade dangerously over the next few years, particularly with regard to Iran and the rest of the Middle East. The risk is less control and oversight over the flow of commodities, technologies, and the knowledge skill sets required to develop and maintain nuclear weapons capabilities combined with a heightened interest in nuclear capabilities in the Middle East fostered by Iran's nuclear program. As the debate intensifies over whether the Iran nuclear deal, or JCPOA, is in U.S. security interests, ensuring robust controls on dangerous goods must be a heightened U.S. priority.

Events contributing to this greater proliferation danger include:

- Relaxed U.S. export control regulations and greater emphasis on global trade with streamlined exchange of intellectual property and commodities, including nuclear commodities;
- On-going doubts over the adequate regulation of sensitive trade to Iran's nuclear programs and the viability of the Iran deal to stop Iran from getting nuclear weapons; and
- The expected actions of additional states to obtain nuclear capabilities to counterbalance Iran.

### **Relaxed U.S. Export Controls**

In 2010, President Obama announced an export control reform initiative which aimed, among other goals, to harmonize an unwieldy and redundant U.S. export control system and reduce regulations on sensitive U.S. technologies and commodities if they were freely available from other worldwide suppliers. One effect of these reforms to date is that temporary disarray at the bureaucratic level, including inefficiencies by agencies tasked with new mandates, has reduced U.S. ability to adequately enforce export control laws and may be leading to slowed efforts to respond to illicit procurement attempts by adversaries, including by Iran. Another more lasting effect is reduced scrutiny of key goods that makes enforcement and prosecution of offenders more difficult. As the sophistication and opacity of illicit procurement schemes has increased worldwide, the U.S. hallmark of strongly enforcing counter illicit trade efforts is weakened, to the detriment of U.S. and global security.

This weakening of U.S. export controls is occurring against a background of expedited border clearance procedures in the United States and greater global economic interconnectivity that seeks expanded trade through streamlined transfers of intellectual property and commodities,

including nuclear and nuclear-related dual-use commodities. Overall, the balance has begun shifting to prioritize trade over national security, even if unintentionally.

### **Inadequate Export Controls on Iran**

At the same time, the nuclear deal with Iran has significantly limited the size and scope of its nuclear program for the relatively short duration of ten years in return for the elimination of most sanctions. This loosening entailed provisions which allow Iran to more freely import nuclear and nuclear dual-use commodities for its authorized civil nuclear and non-nuclear civil programs while seeking to maintain bans on imports to its military industries and non-nuclear civilian industries. Yet, the deal did not insist that Iran commit to stop its illicit procurements abroad for its missile and other military programs, some of which may have dual uses in a nuclear program. This backdrop of continued illegal dual-use purchases has complicated verification of the nuclear deal and made it difficult to ensure that Iran is not secretly buying for an overt or covert nuclear program.

While Iran is continuing to violate national and international controls and bans on importing military and other goods, the P5+1 must prevent Iran from being able to import any goods it desires and cheat on the deal's provisions, by augmenting its nuclear capabilities via illicit imports, or worse, outfitting covert nuclear programs or creating stockpiles to use in a breakout or surge in capability. Even with a strong architecture in place to accomplish these goals, the world has seen an overall loosening of the UN sanctions regime and national export control regimes against Iran and a general atmosphere of confusion among governments and companies worldwide about allowable exports to Iran. This confusion has had spillover effects in places like China, which has poorly implemented controls even as China continues to make improvements on its export control laws and regulations. China is expanding trade with Iran, making it easier for Iran to get banned goods. New approaches are needed to ensure that the Iran deal, which in fact includes the JCPOA and the bans in UN Security Council resolution 2231, actually limits Iran's procurements for its missile, conventional military, and nuclear programs and strengthens U.S. and global counterproliferation efforts.

### **Increased Risk of Middle East Proliferation**

The international community must grapple with the fact that, rather than curbing the spread of dangerous nuclear capabilities in the Middle East, the limitations of the Iran nuclear deal, combined with its temporary duration, have as one consequence created a new norm that legitimizes uranium enrichment programs almost anywhere, even when unneeded for a civilian nuclear program. Instead of setting conditions that are so onerous that no one would want to follow that path, the conditions being applied to Iran are seen as bearable by other states. Moreover, if they first act by placing their programs under safeguards and are transparent, they may avoid the burdensome sanctions that Iran has faced, despite being in regions of tension such as the Middle East. This norm will likely persist even if the Iran nuclear deal collapses, unless Iran is convinced to rollback its uranium enrichment program.

Already, Iran's nuclear program has intensified interest among other Middle Eastern countries in developing their own nascent nuclear capabilities, albeit under a civilian, safeguarded umbrella. If the deal's nuclear limitations start to end in 2026, or the deal collapses before then, Iran's intended, renewed progress on its gas centrifuge enrichment program may have the consequence of stimulating an "enrichment or plutonium race" in the Middle East. This grim possibility must be anticipated and remedies sought to prevent it in the context of further destabilization of the Middle East. Saudi Arabia is already indicating that it will match Iran's nuclear capabilities. Prince Turki bin Faisal, the 70-year-old former Saudi intelligence chief, toured the world with the same message: "Whatever the Iranians have, we will have, too," he said at a conference in Seoul, South Korea. Other Sunni states apart from Saudi Arabia are likely to accelerate their drive to develop their own domestic nuclear programs, even programs to enrich uranium or reprocess plutonium, as they too seek to counterbalance Iran.

Iran's other regional rivals such as Turkey, Egypt, and potentially even the United Arab Emirates (UAE) may seek to initiate or expand domestic sensitive nuclear development programs in order to preserve their regional influence. Initially, these programs can be expected to be fully safeguarded by the International Atomic Energy Agency (IAEA) and openly declared civilian in nature. And like Iran, these countries will heavily depend on overseas procurement of key goods and services, putting even more pressure on trade controls and sanctions to slow or prevent their progress.

In the Middle East, the perceived strategic, political, and military advantages derived from having the ability to enrich nuclear fuel to weaponization levels or to separate plutonium will be too strong for many governments to resist, even in the absence of a full-blown nuclear weapons effort. This dynamic will severely challenge global nonproliferation regimes and agreements as more and more countries strive, overtly or covertly, to become members of "nuclear fuel club," or on the threshold of building nuclear weapons.

The global community should anticipate a dramatic increase in state-sponsored nuclear proliferation activities, regardless of the fate of the JCPOA. Efforts to constrain such aspirations are critical.

The net result of these events is that the world will soon face a greater proliferation danger from Iran and the spread of sensitive technologies in the Middle East may be stimulated by this new, dangerous norm legitimizing enrichment almost anywhere. The policy community must identify threats to the global export control regime and enact broader counterproliferation efforts to mitigate damages. This two-year project has sought to identify and characterize these threats, along with crafting actionable, concrete recommendations to curtail further damage to the nonproliferation regime and in particular to the peace and security of the Middle East.

## Four Studies with Policy Recommendations

This two-year review has identified and characterized threats to the U.S. and associated nuclear export and technology control regimes, focusing on the Middle East. Four major studies in the review seek to develop a framework and countermeasures to mitigate and prevent future damage. They include recommendations for the three issue areas: improving flaws in U.S. export control reforms, strengthening controls on Iran, and preventing the further spread of nuclear weapons to countries in the Middle East:

- ***U.S. Export Control Reform: Impacts and Implications for Controlling the Export of Proliferation-Sensitive Goods and Technologies: A Policy Document for the New President and Congress***, by Andrea Stricker with David Albright, May 17, 2017, Available at: <http://isis-online.org/isis-reports/detail/u.s.-export-control-reform-impacts-and-implications/>
- ***Status of the Iran Nuclear Deal's Procurement Channel***, by David Albright and Andrea Stricker, updated August 16, 2017 (earlier version released April 21, 2016), Available at: <http://isis-online.org/isis-reports/detail/status-of-the-iran-nuclear-deals-procurement-channel>
- ***Saudi Arabia's Nuclear Ambitions and Proliferation Risks***, by Sarah Burkhard, Erica Wenig, David Albright, and Andrea Stricker, March 30, 2017, Available at: <http://isis-online.org/isis-reports/detail/saudi-arabias-nuclear-ambitions-and-proliferation-risks/>
- ***Nuclear Infrastructure and Proliferation Risks of the United Arab Emirates, Turkey, and Egypt***, by Sarah Burkhard, Erica Wenig, David Albright, and Andrea Stricker, August 25, 2017, Available at: <http://isis-online.org/isis-reports/detail/nuclear-infrastructure-and-proliferation-risks-of-the-united-arab-emirates/>

These studies and their findings serve as the basis for the conclusions of this comprehensive policy report.

**ISSUE 1:**  
**SHORING UP THE GLOBAL EXPORT CONTROL REGIME AND BETTER CONTROLLING  
THE SPREAD OF SENSITIVE TECHNOLOGIES THROUGH A STRONG U.S. EXPORT  
CONTROL SYSTEM**

***Institute Study:***  
**U.S. Export Control Reform: Impacts and Implications for  
Controlling the Export of Proliferation-Sensitive Goods and Technologies  
A Policy Document for the New President and Congress**

**By Andrea Stricker with David Albright**

**May 2017**

**Executive Summary<sup>1</sup>**

The United States' export control system serves a vital role in preventing the spread of proliferation-sensitive goods to the nuclear, missile, and military programs of our adversaries, such as Iran and North Korea. Both countries, among others, mount aggressive efforts to obtain controlled goods from the United States and other suppliers. Stopping these countries from succeeding requires a robust, effective export control system.

The U.S. control system is complex. Authorities and control lists are delegated to multiple federal agencies, and the system was created largely piecemeal to prevent the spread of sensitive goods during the Cold War. Governmental and non-governmental analyses, along with the relevant exporting sectors of industry, have noted for decades serious problems with the system, including the slow pace of obtaining an export license, overregulation of small parts, the failure of the government to standardize and interconnect information technology (IT) systems, and inefficiencies and redundancies in export law enforcement efforts. With these criticisms in mind, the Obama administration set out in 2009 to carry out a wholesale reform of the system and in 2010 launched the Export Control Reform Initiative (ECR Initiative). The ECR Initiative planned to create a single export licensing agency, merge commodity control lists into a single list, adopt a common IT system, and move most export enforcement efforts under the purview of a single agency. These so-called "four singles" were never achieved due to a shortage of time and a lack of Congressional support for carrying out a bureaucratic restructuring of this scale. Several important and impactful reforms did occur, however, bringing the reforms part of the way to completion.

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<sup>1</sup> The full report is available here: [http://isis-online.org/uploads/isis-reports/documents/Export\\_Control\\_Reform\\_Initiative\\_Review\\_and\\_Recommendations\\_May\\_2017\\_Final.pdf](http://isis-online.org/uploads/isis-reports/documents/Export_Control_Reform_Initiative_Review_and_Recommendations_May_2017_Final.pdf)

The Institute for Science and International Security became interested in the results of President Obama's ECR Initiative in 2015, after hearing differing opinions about the impacts of the reforms. The reforms generated intense controversy among experts, officials, company officials, and practitioners who were involved in the initiative or had seen initial results regarding the control of proliferation-sensitive goods. It decided to investigate the reforms and contact a wide range of officials and experts to better understand and assess the ECR Initiative.

What it found is that the ECR Initiative at its core attempted to address the question of what the appropriate balance is between increasing U.S. exports and trade and maintaining strict control of sensitive goods in order to enhance national security objectives. Overall, we assess that the reforms tilted the balance more toward increasing exports and trade at the expense of controls and national security. As a result of the reforms, thousands of items usable in military systems and equipment are now more readily available to long time U.S. allies, as well as to some countries of governance or transshipment concern. Little effort was devoted to better securing the most proliferation-sensitive goods. In response to the inherent question asked by the reforms: should the United States loosen controls on items that are being made available from other countries – the answer reached appears to have been tilted to the affirmative. As a result, it is far from clear whether U.S. adversaries such as Iran and North Korea are now increasingly able to obtain sensitive parts and components to outfit their military and other sensitive programs.

Moreover, the export control reforms were announced by the Obama administration to Congress and the business community as an effort to fix overregulation of the most innocuous items and allow allies to obtain needed items more easily, while more tightly regulating the most sensitive goods. These goals are not problematic if the items truly are innocuous and the changes addressed legitimate concerns of the government, allies, and exporters. However, the effort may have simply contributed to increasing the world's supply of sensitive goods usable in military programs – and thereby increasing availability of such goods to adversaries. This result is likely to be at odds with overarching U.S. national security goals in the long term. In addition, most agree that finishing the ECR Initiative as originally envisioned would be challenging but that stopping the process before the intended completion also has its own risks. It is important for the Trump administration and Congress to take stock of the ECR Initiative's accomplishments, including determining the impacts of completing or not completing the process.

## **Highlights of the ECR Initiative and Recommendations**

### **Transfers of Goods from the United States Munitions List to the Commerce Control List**

The ECR Initiative involved the transfer of thousands of items from the United States Munitions List (USML) under the Arms Export Control Act's (AECA) International Traffic in Arms Regulations (ITAR) and administered by the State Department's Directorate of Defense Trade Controls (DDTC), to the Commerce Control List (CCL) under the Export Administration Regulations (EAR), which is administered by the Commerce Department's Bureau of Industry



and Security (BIS). The EAR is maintained by the president's annual renewal of the state of emergency under the International Emergency Economic Powers Act (IEEPA) following the expiration in 2001 of the Export Administration Act (EAA). The CCL allows for the more flexible export of former USML items that the government deemed to be not worthy of the strictest control. The EAR also allows for the unlicensed export of certain categories of goods to country groups, whereas the ITAR does not specify this ability. The ITAR as administered by the State Department usefully allows the Secretary of State to weigh in on transfers of the most sensitive military items as to their impact on foreign policy and national security objectives.

A substantial part of the ECR Initiative involved an elaborate bureaucratic and time intensive process of reviewing and moving individual goods from the USML to the CCL. This process was thorough, technically rigorous, and involved what is often pointed to as unprecedented interagency collaboration. The effort required the entirety of six years of the reforms, or from 2010 to 2016.

Nonetheless, on balance, we find that the transfer of goods from the USML to the CCL represented a weakening of controls. This is due in part to the number of licensing exceptions, or terms under which an entity does not have to obtain a U.S. government license, that are available on the CCL. In addition, some of the exceptions include well-known countries of transit concern such as Turkey. Overall, there is a broad conception that goods on the CCL are controlled less effectively than those on the USML. An example of this is the fact that categories 1-3 of the USML covering firearms, artillery, and ammunition were not transferred to the CCL due to concern that doing so could lead to the proliferation of firearms internationally. Federal law enforcement agencies vehemently opposed the transfer of these items to the CCL due to fears that they would spread more rapidly or be re-transferred to unintended end users. Overall, they feared that the transfers would complicate national and international security objectives.

In addition, some of the firearms prepared for transfer are inherently deadly weapons that should not be in the hands of U.S. adversaries or those who would use them for their own nefarious objectives, including in civil wars or to violently put down domestic uprisings. It is worth noting that Turkey is in the midst of an authoritarian crackdown and may be seeking weapons and other sensitive items for such use. The planned list transfers include high caliber sniper rifles and weapons that could be later modified to render them even more deadly. They could also be exported to actors that would seek to use them against U.S. troops in conflict situations. The new administration needs to ask: What beneficial purpose would the transfers serve? Some have argued for the transfers as export promotion, but we would urge the administration to ask what security risk this poses.

We understand that the categories 1-3 transfers appear imminently prepared for completion by the State Department. We would urge Congress and the administration to quickly become involved and halt the effort, given the extent of concerns. Moving forward with the transfers appears risky and it would also diminish the State Department's ability to weigh in on the security impact of arms related transfers. At the very least, if they are transferred, some of the

most deadly weapons should require stricter controls and not be granted eligibility for license exceptions on the CCL.

A major objective of the Obama administration was to reduce the number of items on the USML in order to allow more time and resources for officials to scrutinize export requests for the remaining goods on that list. More scrutiny is a worthwhile goal. However, as stated above, it is difficult to see how the administration's pledge to erect "higher fences" around those remaining "crown jewels" has been accomplished. In fact, the administration appears to have devoted little effort to developing enhanced protection of the items remaining on the USML. Nothing in practice was done to strengthen the controls on the USML side, or for that matter, controls for those goods already on the CCL, while placing more goods on the CCL has led to an increase of exports of thousands of sensitive items that alone are typically innocuous but have dual uses in outfitting military systems and equipment. The effects of this deregulation are still not adequately understood. Some loopholes in the form of general licensing and other exceptions also could have been addressed, but were not, under the reforms.

Given the time and amount of effort involved, however, there would be little technical justification to move goods back to the USML from the CCL unless there is overriding evidence of the need for such transfers. If studies and evidence of problems find that certain items should go back to the USML, this could be considered. A potential tightening of the licensing process and reduction in the number of goods allowed exceptions by the Commerce Department may be warranted as well as adding additional criteria for making decisions about the control status of exports. In general, the effects of these transfers require intensive governmental studies as to their effects on U.S. and international security.

Some nuclear-related items were transferred from the USML to the control of the Department of Energy (DOE) under the Atomic Energy Act (AEA). The transfer of nuclear-related items from the USML to the DOE was viewed as beneficial and not a weakening of controls. Nonetheless, a review of the implementation and effectiveness of this transfer is needed. In addition, a review is needed to determine if higher fences should be applied to certain critical items on both the USML and CCL.

**Strategic Trade Authorization.** The critical exception created for the USML goods moved to the CCL is the Strategic Trade Authorization (STA). This exception, which involves the former USML items under a newly created 600 series category of goods on the CCL, is the mechanism that allows for unlicensed exports within a certain set of criteria to a specified group of countries. The ultimate end user must be a government, although the initial importer can be a company. The STA group of countries includes most NATO members and other close U.S. allies to which the U.S. government seeks to export military related items to more easily. The importing entities are subject to a range of controls, such as having already been vetted for a previous Commerce Department license. However, they may exploit this exemption over time and onward proliferation may occur outside the awareness or scrutiny of the United States. It is also possible that an approved government recipient could send goods to unauthorized end

users. USML categories 1-3 goods, if transferred over, would be eligible for the STA as currently envisioned.

### **Specially Designed**

The Obama administration harmonized definitions on the USML and CCL, in particular what constitutes the control of goods that are “specially designed” for use in a sensitive piece of equipment. The stated intention of that change was to narrow the scope of the controls over smaller parts and items that are used in larger military equipment, thus freeing them from overregulation.

The new specially designed definition is controversial and needs to be reviewed. The changes to the definition of specially designed goods on the USML and CCL may have weakened enforcement efforts overall due to what U.S. prosecutors view as the definition’s problematic interpretation and historical cases. This may render it as having weak standing in court. U.S. attorneys may now seek to prosecute only the most clear-cut cases relating to country sanctions violations, such as those involving Iran, North Korea, or China. A governmental study is needed to look at how enforcement of the ITAR and EAR specially designed definitions are implemented by federal agencies following the reforms and how the changes are interpreted in practice by U.S. prosecutors and courts.

The Trump administration should revisit and consider strengthening the design intent definition changes or otherwise change the definition to one that will have a better chance of holding up in court.

### **Export Enforcement Coordination Center**

The standing up of the Export Enforcement Coordination Center (E2C2) was a key accomplishment of the ECR Initiative. E2C2 provides de-confliction of cases and ensures that all enforcement agencies are aware of what others are doing or have collected on a particular case, helps delegate and streamline export investigations among agencies, and builds more effective criminal investigations. We find that its role should be strengthened and broadened, and it should be granted devoted, annual funding by Congress, including the ability to hire its own employees who are currently drawn from the Department of Homeland Security (DHS) and other agencies. Its existing deconfliction mandate would be supported through increased resources thus allowing for an expanded and more efficient deconfliction process.

E2C2’s intelligence coordination mandate could also be bolstered and broadened. Its mandate could be broadened further to coordinate pre- and post-shipment verification performed by the various export agencies.

The Trump administration and Congress should also establish E2C2 as an information sharing point of contact for companies and academic institutions, since it already successfully acts as a deconfliction center and works with export control implementation, intelligence, and

enforcement agencies. Such an initiative should encourage companies to voluntarily report on, or even require them to report on, suspicious approaches by potentially illicit customers to purchase controlled or sensitive goods. In turn, the E2C2 could provide tips or other information about what to watch for in the way of suspicious activities. Legislation may be required to provide liability protections for companies and to allow for declassifications of government information provided to industry.

### **Need to Bolster Enforcement Efforts**

The Department of Justice (DOJ) should provide guidance to U.S. prosecutors stating that strong criminal enforcement of trade control violations is a national priority for the administration. It should also encourage prosecutions of violations not involving traditional U.S. adversary countries or countries of transit concern, in addition to reiterating the need for ongoing focus on sanctioned countries.

DOJ should commit to more aggressively investigating, indicting, and extraditing those involved in outfitting Iran's nuclear, missile, or conventional weapons programs in defiance of U.S. laws and sanctions. During the Obama administration's efforts to negotiate and maintain the Iran nuclear deal, there was an excessive denial or non-processing of extradition requests and lure memos out of a misplaced concern about their effect on the deal.

### **Consolidating Enforcement at Homeland Security Investigations While Leaving Voluntary Compliance in Place**

Problems need to be addressed concerning an increased overlap of authorities between the Commerce Department's Office of Export Enforcement (OEE), which is authorized to conduct export enforcement of CCL goods, and the Department of Homeland Security (DHS)'s Homeland Security Investigations (HSI), which has authority to handle both USML and CCL goods. By not completing the fourth single – or folding OEE into HSI as originally envisioned – OEE and HSI now have even more jurisdictional overlap of controlled items than before the ECR Initiative was initiated. This is due to the fact that HSI already had enforcement authority for both USML and CCL goods and OEE only had jurisdiction over CCL goods. Now that thousands of USML goods have transferred to the CCL, jurisdictional overlap between these agencies has significantly increased. The result is increased confliction issues and the possible expenditure of unneeded resources. Complicating matters is the role of the Federal Bureau of Investigation (FBI) which can handle general national security cases involving proliferation-sensitive goods.

In general, HSI has claim to wider authorities and a larger cadre of employees than Commerce's OEE. We recommend, while recognizing that this recommendation is controversial to some, that the Trump administration should fold Commerce's criminal enforcement sections in OEE into HSI, as originally envisioned under the ECR Initiative. However, BIS's authority and expertise to evaluate voluntary compliance would be retained and operate in parallel to DDTC's voluntary disclosure process. The FBI would maintain its current role. This reform would be a

positive step toward making the enforcement system more efficient and consolidate DHS/HSI as the primary agency responsible for enforcement of the EAR and CCL items.

In this process, the Trump administration should also direct BIS to evaluate and, as necessary, reform its voluntary self-disclosure process to operate more in the fashion of DDTC's voluntary disclosure process. DDTC's process is viewed as more lenient toward accidental violations than BIS's, but levying of harsher penalties for egregious or repeat violators.

### **Consolidated Screening List**

Another major accomplishment was the creation of a Consolidated Screening List (CSL) in 2010 of entities and individuals so that exporters and the government no longer need to consult up to six separate lists for denied parties.

### **Information Technology Improvements**

We find that the administration should direct the Defense Technology Security Administration (DTSA) to continue its efforts begun under the ECR Initiative to institute more integrated government IT platforms for export administration and licensing and work to overcome barriers in IT system compatibilities. Congress should fund this effort.

The formation of some elements of a common IT system occurred on the government's end by implementing use of a previously created Department of Defense (DOD) government IT interface for licensing, USXPORTS. It is being used by the State Department, but the Commerce Department has not yet transitioned to the platform.

### **Other Recommendations**

The administration should review other exceptions, such as the Additional Permissive Re-export exception under the CCL, and seek to close such loopholes that could be exploited by illicit actors. It should investigate and put a stop to any practice by the Commerce Department that involves issuing licenses for EAR 99 indexed goods without first investigating whether the goods are subject to the USML.

The administration should work to establish "watch lists" for major nuclear, missile, and military technologies based on existing control lists and proliferant state smuggling efforts and distribute them to relevant companies. Not all such goods are currently covered by export controls; however, they may be sought by a proliferant state, and they should be considered for inclusion on control lists. In addition, these lists could inform which items on the USML and CCL need higher fences.

The administration and Congress should continue to hear issues raised by the business community about ease of exporting and comprehending regulations under the reformed system, particularly those experienced by small businesses, which are under-resourced in many

cases to cope with the massive compliance changes and may still be adjusting. They should assess whether exporters are still having difficulties determining the control status of goods under the new system. They should make practical changes and continue to address issues of undue administrative and regulatory burdens without sacrificing the primary mission of controlling the export of proliferation-sensitive goods.

### **Administration and Congressional Review**

Critical to moving forward is reviewing and refreshing the ECR process. Toward those goals, the president should establish at the National Security Council (NSC) a special advisor who would be wholly focused on export control coordination, implementation, and enforcement matters.

In order to better understand the reforms to date, the Trump administration should direct BIS and HSI to provide a joint report that performs an in-depth sampling and assessment of former USML goods' status, locations, and end uses. The reporting should contain statistics about specific goods authorized and actually exported and where these goods are today. It should include statistics on license or exception denials, close calls in exporting to unauthorized end users, and use of pre- and post-shipment and end use checks and related results. Reporting should also involve critically examining the results of enforcement efforts and investigations including real world examples.

The administration should request that BIS conduct a thorough examination of the end uses of STA exception goods processed since 2011, or near the start of the reforms, to ensure that the exception is not being taken advantage of over either the short or long term, particularly by countries of transit concern that fall into the STA authorized category. A BIS priority should be to continually conduct checks on goods exported since the exception's creation to ensure that they have not been re-transferred.

Congress can play a role, if needed, by passing legislation requiring in-depth reporting as described above on a consistent basis, such as in biannual reports. Each of the described reporting efforts should include information on cases in which nefarious attempts to procure U.S. exports by unauthorized end users were successfully blocked or not blocked by the new system. The reports should contain specific, targeted questions that require the executive branch to critically self-examine and indicate how well the system is performing based on data and actual incidents.

Congress should direct the Government Accountability Office (GAO) to produce a comprehensive report looking at the impacts of the ECR Initiative regarding the control of proliferation-sensitive goods and improvement or degradation in government functions. This effort should attempt to assess the impact of the freer flow of goods on U.S. security interests and use specific, targeted questions, such as the ones above, in order to obtain a critical look at executive branch activities.

Congress should request a GAO report on the status of enforcement-related changes to the export control system, including the increased overlap between OEE and HSI, and query whether prosecutors are now more discouraged in bringing EAR cases to court or are having difficulty enforcing the new definition of specially designed.

Congress should hold a series of hearings during its next session to gauge the impact and success of the ECR Initiative. Through the hearings and studies, Congress should assess whether new action, including legislation, is required to repair flaws in the system and ensure proliferation-sensitive goods are adequately controlled.

The administration should utilize the results of all of these review efforts to repair weaknesses in the system or add additional criteria for obtaining proliferation-sensitive goods. Export licensing and enforcement agencies should review all of the reporting in an interagency effort to determine if changes are needed. Congress should structure the legislation so that the agencies have clear incentives to respond to the review effort.

As part of this review, Congress should consider the question of whether to implement comprehensive export control legislation and finish the implementation of the ECR Initiative's originally envisioned four singles. Congress should consider review and passage of an Export Control Reform Act as originally proposed by an ECR Initiative Presidential Task Force. The legislation would create a single export control list, a single export licensing agency, and a consolidated primary export enforcement agency (merger of OEE into HSI).

Absent that action, Congress should update and pass a new EAA and eliminate the annual renewal requirement under the IEEPA as currently required. The original's expiration in 2001, rendering the EAR subject to IEEPA and U.S. presidents renewing annually the state of emergency regarding export regulation under that statute, is not an ideal mechanism for export enforcement.

There are also enforcement related concerns in perpetually using IEEPA for export enforcement. Other countries are reportedly more hesitant to cooperate on mutual assistance or extradition requests for IEEPA cases because offenses are often viewed as political crimes with no similar statutes in the receiving nation. As a result, U.S. prosecutors typically add other charges (such as fraud, making false statements, smuggling, etc.) to IEEPA violation cases in order to bolster the chances that a judge or foreign magistrate will adequately acknowledge the dual criminality necessary for international law enforcement assistance. There is also concern that a single court case overturning an IEEPA violation could bring down the EAR enforcement system. A new EAA or comprehensive export control reform legislation would obviate these problems.

As this review occurs, *U.S. Export Control Reform: Impacts and Implications for Controlling the Spread of Proliferation-Sensitive Goods and Technologies*, provides a baseline of information about the ECR Initiative. It is also a way to start assessing the reforms completed during the Obama administration, in addition to those that are still needed. Over the next year, the

president and Congress should place this issue high on their agendas for study, review, and further action.

Our full set of solutions aimed at better securing efforts to prevent the spread of proliferation-sensitive goods under a reformed U.S. export control system follows. We suggest ways for the Trump administration and Congress to further implement and strengthen the export control reforms:

- 1) The Trump administration should direct BIS and HSI to provide a joint report that performs an in-depth sampling and assessment of former USML goods' status, locations, and end uses. The reporting should contain statistics about specific goods authorized and actually exported and where these goods are today. It should include statistics on license or exception denials, close calls in exporting to unauthorized end users, and use of pre- and post-shipment and end use checks and related results. Reporting should also involve critically examining the results of enforcement efforts and investigations including real world examples. DHS/HSI has extensive international assets to supplement OEE's effort at conducting end use checks. It also has the capability via its Border Enforcement Analytics Program (BEAP), which mines hundreds of millions of U.S. export data to identify and turn up suspicious transactions for compliance checks. The report authors should obtain all relevant information about the spread of such goods, if applicable, from the State Department, Department of Treasury, FBI, and E2C2, and seek information from the intelligence community.

Reporting should provide both public and confidential versions. The confidential version should include proprietary licensing data and detailed information about goods, their end uses and end users, and should be provided to Congress for oversight purposes. The report should also include a section on which cases led to criminal indictments and prosecutions, and if they did not, why the government chose not to prosecute. The public version should contain less sensitive information, such as the number of investigations conducted, percentage of those that resulted in inquiries or action, and regions of the world involved. It should describe several cases and include more information, particularly on the types of goods that led to follow-up action. It should discuss in broad terms whether criminal prosecutions have increased or decreased as a result of the reforms.

- 2) The administration should request that reporting include a thorough examination of the end uses of STA goods processed since 2011 to ensure that the exception is not being taken advantage of over either the short or long term, particularly by countries of transit concern that fall into the STA authorized category. A BIS priority should be to continually conduct checks on goods exported since the exception's creation to ensure that they have not been re-transferred.
- 3) The administration should review other licensing exceptions, such as the APR exception, and seek to close such loopholes that could be exploited by illicit actors. It should



investigate and put a stop to any practice by the Commerce Department that involves issuing licenses for EAR99 indexed goods without first investigating whether goods are subject to the USML.

- 4) The administration should revisit and consider strengthening the design intent definition changes and change the definition to one that will have a better chance of holding up in court. The ECR Initiative appears to have created a weakening of this definition.
- 5) Congress should provide a line item for funding reporting if needed. Congress can also play a role by passing legislation requiring in-depth reporting as described above on a consistent basis, such as in biannual reports. Reporting efforts should include information on cases in which nefarious attempts to procure U.S. exports by unauthorized end users were successfully blocked or not blocked by the new system. Reports should contain specific, targeted questions that require the executive branch to critically self-examine and indicate how well the system is performing based on data and actual incidents. Congress should structure any legislation so that the agencies have clear incentives to respond to a review effort.
- 6) The administration should utilize the results of all of these review efforts to repair weaknesses in the system or add additional criteria for obtaining proliferation-sensitive goods. A potential tightening of the licensing process and reduction in the number of goods allowed exceptions by the Commerce Department may be warranted as well as adding additional criteria for making decisions about the control status of exports. Export licensing and enforcement agencies should review all of the reporting in an interagency effort to determine if changes are needed.
- 7) Congress should direct GAO to produce a comprehensive report on the impacts of the ECR Initiative regarding the control of proliferation-sensitive goods and improvement or degradation in government functions. The Obama administration's claim that the reforms would create a "higher fence" around the most important proliferation-sensitive goods appears unfounded based on our report, since it remains unclear how the controls were made stricter for such goods. GAO should ask for its own targeted data or use data drawn from the joint BIS and DHS study recommended above about transfers from the USML to the CCL and goods exempted under the STA. The review should consider also the transfer of nuclear-related items from the USML to DOE. The report should answer whether U.S. adversaries have benefited from deregulation or changes in regulations. In addition, this effort should attempt to assess the impact of the freer flow of goods on U.S. security interests and use specific, targeted questions in order to obtain a critical look at executive branch activities.
- 8) Given the unclear status of whether prosecutors are now discouraged in bringing EAR cases to court or are having difficulty enforcing the new definition of specially designed, Congress should request a GAO report on the matter. GAO should query a large sampling of U.S. Attorneys in order to understand their current thinking in the post-ECR

era. This report should also assess whether U.S. prosecutions of CCL 600 series goods have increased or decreased following the reforms. It should take into consideration the role of settlements between the government and companies. Congress should also request that GAO report on the status of enforcement-related changes to the export control system, including the increased overlap between OEE and HIS.

- 9) Because of the importance of export controls to U.S. national security, the president should establish a special advisor at the National Security Council (NSC). This person should be wholly focused on export control coordination, implementation, and enforcement matters. The official would facilitate coordination and resolve differences among agencies, fully implement and remediate problems in the export control reforms, and serve to ensure the effectiveness of export controls. Relevant officials are typically focused on these issues in addition to other nonproliferation related matters. The administration should also improve interagency coordination mechanisms for export control and contact between the law enforcement side of export controls and the policy implementation side.
- 10) DOJ should provide guidance to U.S. prosecutors stating that strong enforcement of EAR violations is a national priority for the administration. It should also encourage prosecutions of violations not involving traditional U.S. adversary countries or countries of transit concern, in addition to reiterating the need for ongoing focus on sanctioned countries.
- 11) DOJ should commit to more aggressively investigating, indicting, and extraditing those involved in outfitting Iran's nuclear, missile, or conventional weapons programs in defiance of U.S. laws and sanctions. During the Obama administration's efforts to negotiate and maintain the Iran nuclear deal, there was an excessive denial or non-processing of extradition requests and lure memos out of a misplaced concern about their effect on the deal. These actions, largely concentrated in the State Department, reportedly interfered in investigations and served to discourage new or on-going federal investigations of commodity trafficking involving Iran. This trend needs to be reversed by a policy to encourage investigations of Iranian (and other pariah state) commodity trafficking efforts that includes a determined extradition process.
- 12) The administration should work to establish "watch lists" for major nuclear, missile, and military technologies based on existing control lists, along with proliferant state smuggling efforts, and distribute them to relevant companies. Not all such goods are currently covered by export controls but may be sought by a proliferant state. The administration should initiate an effort to make key goods on the watch lists licensable under export controls and subject to end-use verification. In addition, these lists could inform which items on the USML and CCL need higher fences. This effort would help close loopholes not covered by the reforms.

- 13) The administration and Congress should continue to hear issues raised by the business community about ease of exporting and comprehending regulations under the reformed system, particularly those experienced by small businesses, which are under-resourced in many cases to cope with the massive compliance changes and may still be adjusting. They should assess whether exporters are still having difficulties determining the control status of goods under the new system. They should make practical changes and continue to address issues of undue administrative and regulatory burdens without sacrificing the primary mission of controlling the export of proliferation-sensitive goods.
- 14) President Trump should not finalize the transfer of USML categories 1-3 given the extent of concerns about arms trafficking. Congress should intervene if needed. Moving forward with the transfers appears risky for international security objectives and arms trafficking prevention efforts and avoiding these weapons' use against U.S. troops abroad. DDTC's FY 2015 Blue Lantern program findings that the majority of re-transfer cases relate to firearms underscores this concern. These categories of goods should remain subject to the ITAR and USML, or at the very least if they are transferred, these deadly weapons should not be available under the STA exception.
- 15) The administration should direct BIS to reform its voluntary self-disclosure process to operate more in the fashion of DDTC's voluntary disclosure process. In other words, BIS should not levy fines simply for mistakes or inadvertent exports by companies that otherwise make every effort to have strong export compliance programs. This may encourage more VSDs and better relationships between BIS and the companies with which it deals – which is even more important today given the increased licensing load for CCL items. Taking action against fewer companies, but producing demonstrably larger penalties for those companies that have proven to be negligent, appears to be a sounder approach.
- 16) The administration should direct DTSA to continue its efforts to institute more integrated government IT platforms for export administration and licensing. Congress should fund this effort.
- 17) Based on interviews and government data, improved communication and coordination of enforcement activities has resulted from the creation of E2C2. This is positive for enforcement efforts overall. E2C2's mission should continue and Congress should support its mandate by providing it with a dedicated supply of annually renewed funding plus any needed annual increases. E2C2's mandate would be more effective if it had more reliable and adequate funding and could also hire its own employees as needed rather than deriving them from DHS and other agencies. Its existing deconfliction mandate would be supported through increased resources thus allowing for an expanded and more efficient deconfliction process. E2C2's intelligence coordination mandate could also be bolstered and broadened. Its mandate could be broadened further to coordinate pre- and post-shipment verification performed by the various export agencies.

18) The administration and Congress should establish E2C2 as an information sharing point of contact for companies and academic institutions, since it already successfully acts as a deconfliction center and works with export control implementation, intelligence, and enforcement agencies. Such an initiative should encourage companies to voluntarily report on, or even require them to report on, suspicious approaches by potentially illicit customers to purchase controlled or sensitive goods. In turn, E2C2 could provide tips or other information about what to watch for in the way of suspicious activities. Such a mechanism would require legislation to create liability protection so that companies cannot be sued by other companies for providing that information. Moreover, at present, companies and the government are too separated by the barriers of classification. Legislation would also be needed to overcome classification problems which exist on the government's side for sharing information about active illicit procurement networks. At a minimum, the system should allow the government to deliver single instance, declassified or unclassified albeit confidential, information to industry.

Authorizing two-way information sharing would provide the U.S. government with actionable intelligence on illicit networks from companies and allow companies to better prevent unintentional exports to nefarious actors. As a coordinating body, E2C2 could easily ensure that relevant federal agencies receive these reports of suspicious activities. A precedent for voluntary reporting and cooperation would be the Cybersecurity Enhancement Act of 2014 which provides for a "voluntary public-private partnership to improve cybersecurity."<sup>2</sup> A form of mandatory reporting or information sharing is in place under the U.S. Bank Secrecy Act, which requires all companies to report on suspicious transactions, while providing liability protection.<sup>3</sup> The Act requires financial institutions to help the government "detect and prevent money laundering" by making Suspicious Activity Reports (STRs) about potentially criminal financial transfers to the Treasury Department's Financial Crimes Enforcement Network (FinCEN).

19) The Commerce Department's OEE is by most accounts highly specialized and talented at carrying out its mission of export enforcement of items on the CCL. Yet it has an overwhelming task at conducting physical verification and end-use checks on the vastly increased amount of goods being exported via the CCL and STA exception. In addition, it lacks international reach; it has only seven export control officers stationed abroad to conduct such checks, whereas DHS/HSI possesses hundreds of officers stationed abroad. From our analysis and interviews, the answer to resolving this imbalance does not appear to be increased funding or the addition of more OEE officers. Moreover, our interviews indicate that streamlining the export enforcement mission further would eliminate

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<sup>2</sup> S.1353 (113<sup>th</sup>): *Cybersecurity Enhancement Act of 2014*, December 11, 2014. Available at: <https://www.govtrack.us/congress/bills/113/s1353/text>

<sup>3</sup> U.S. Department of the Treasury, Financial Crimes Enforcement Network, "FinCen's Mandate from Congress," [http://www.fincen.gov/statutes\\_regs/bsa/](http://www.fincen.gov/statutes_regs/bsa/)

existing redundancies and benefit the effectiveness of the enforcement mission overall. By not completing the fourth single – or folding OEE into HSI as originally envisioned – OEE and HSI now have even more jurisdictional overlap of controlled items than before the ECR Initiative was initiated. This is due to the fact that HSI already had enforcement authority for both USML and CCL goods and OEE only had jurisdiction over CCL goods. Now that thousands of USML goods have transferred to the CCL, jurisdictional overlap between these agencies has significantly increased. The result is increased confliction issues and the possible expenditure of unneeded resources.

The president and Congress should fold OEE's enforcement sections into DHS/HSI and integrate specialized OEE criminal investigators into the HSI export enforcement mission. DHS/HSI would then be the primary agency responsible for enforcement of the EAR and CCL items. The FBI should still retain general investigatory authority in export cases. BIS's authority to evaluate voluntary compliance would be retained and operate in parallel to DDTC's voluntary disclosure process. This would be a positive step toward making the enforcement system more efficient and consolidate DHS/HSI as the primary agency responsible for enforcement of the EAR and CCL items.

- 20) Congress should hold a series of hearings during its next session to gauge the impact and success of the ECR Initiative. It should also commission additional Congressional studies similar to the above recommended GAO reports to support these hearings. Through the hearings and studies, Congress should assess whether new legislation is required to repair flaws in the system and ensure proliferation-sensitive goods are adequately controlled.
- 21) Congress should consider the question of whether to implement comprehensive export control legislation and finish the implementation of Phase III and the four singles. This would include review and passage of an Export Control Reform Act as originally proposed by the ECR Initiative Presidential Task Force. The legislation would create a single export control list, a single export licensing agency and a consolidated primary export enforcement agency (merger of OEE into HSI). Congress should proceed cautiously in the creation of a single licensing agency, control list, and related IT capability and ensure that the matter of how to accomplish the four singles effectively is worked out due to the implications of a bureaucratic restructuring of this size. Congress should hold a transparent review period and create a phased plan as part of such legislation.
- 22) Absent that action, Congress should update and pass a new EAA and eliminate the annual renewal requirement under the International Emergency Economic Powers Act (IEEPA) as currently required. The original expired in 2001 and has rendered the EAR subject to IEEPA and U.S. presidents renewing annually the state of emergency regarding export regulation under that statute. If it does not, as is the current practice, the president will need to reauthorize the state of emergency under the IEEPA on an annual basis.

**ISSUE 2:**  
**THE IMPACT OF THE LOOSENING OF THE IRAN SANCTIONS REGIME ON  
GLOBAL COUNTER-ILLCIT NUCLEAR TRADE EFFORTS**

***Institute Study:***  
**Status of the Iran Nuclear Deal's Procurement Channel**

**By David Albright and Andrea Stricker**

**August 16, 2017 (Earlier [version](#) issued on April 21, 2016)**

*The Procurement Channel of the Joint Comprehensive Plan of Action (JCPOA) is a potentially valuable transparency and verification tool aimed at controlling the export of goods to Iran's authorized nuclear programs and non-nuclear, civil end users. Troubling problems emerged early on and weakening compromises and exemptions were made that called into question if the Procurement Channel could truly be an effective monitoring mechanism for Iran's nuclear-related imports. A particular challenge to the viability of the channel is Iran's on-going commitment to illicitly procuring sensitive goods for its missile and military programs, combined with a long history of illicit nuclear and nuclear-related procurements. Until the channel is better established, the United States should adopt a policy of a presumption of denial with regard to Iranian proposals to the channel, unless two conditions are met. The first condition is a determination that the parties seeking the goods do not have any involvement with Iran's military industries or entities, particularly the Iran Revolutionary Guard Corps (IRGC), or companies linked to any of these entities. The second is rigorous, reliable, on the ground checks on the use of goods in Iran after they are imported, otherwise known as "end use checks."*

*Moreover, the procedures of the Procurement Channel need reform within the context of the JCPOA, which should be pursued at the Joint Commission in order to repair some of the channel's other deficiencies. Investing the appropriate time, attention, and resources is critical to ensuring that the Procurement Channel is successful at regulating exports of proliferation-sensitive goods to Iran. In the longer term, Iran should be pressed to create an internationally acceptable export control system, as it stated in the JCPOA it intends to do. However, this effort makes sense only if Iran commits not to undermine, or worse, make a mockery of, such an internationally acceptable export control regime by conducting illicit procurements for its own military programs. In addition, much more scrutiny is needed of any Iranian cooperation on missiles with North Korea and other pariah states, as well as investigating whether there is any nuclear cooperation between Iran and North Korea. A full list of proposed remedies and reforms is at the end of this report.*

The Procurement Channel is a potentially valuable transparency and verification condition in the JCPOA aimed at controlling the export of goods to Iran's authorized nuclear programs and non-nuclear, civil end users. This condition was institutionalized for ten years in United Nations Security Council (UNSC) resolution 2231 in January 2016. Under the JCPOA and the UN resolution, the Procurement Channel's purpose, for the first ten years of the JCPOA, is to regulate the flow of sensitive goods to Iran's authorized nuclear programs and non-nuclear civil end users. It seeks to deny Iran opportunities, or at least help expose any efforts, to violate the JCPOA and increase the transparency of Iran's nuclear programs. In particular, an effective Procurement Channel would provide confidence that Iran is not acquiring or stockpiling goods for undeclared nuclear activities, including a covert gas centrifuge facility, or for a surge in building up its nuclear capabilities if the nuclear deal collapses. These activities are particularly difficult for international inspectors to detect, even with the Additional Protocol in effect. An unstated but important purpose of the Procurement Channel is to prevent Iran from exploiting its increased ability to conduct legitimate trade to outfit illegally its ballistic missile and conventional arms programs.

Since Implementation Day, the P5+1 and UN Secretariat have been establishing the administrative aspects of this new international architecture. The process involves a state submitting a proposal to the UN Security Council, Security Council Affairs Division (SCAD), and the UNSC Facilitator on behalf of a company residing in that particular state that wants to export certain goods to Iran. The UN in turn sends the proposal, via the JCPOA Joint Commission, to the Procurement Working Group (PWG), which is the primary decision-making body for the Procurement Channel. Members of the PWG include one voting member each of the P5+1 and Iran. However, setting up this infrastructure proved difficult; our Institute spoke to several officials from different organizations and P5+1 governments who reported significant initial challenges, some of which remain ongoing.

Broader sets of analyses of current and potential issues with the Procurement Channel as well as remediation steps were released by the Institute in [August](#) and [December](#) 2015.

## Proposals So Far

From Implementation Day until mid-June 2017, according to reporting by the UN facilitator of Resolution 2231, a total of 16 proposals had been submitted to the PWG, including by non-JCPOA member states.<sup>4</sup> During the first year of the JCPOA, there were only six proposals submitted to the PWG, four of which came in May 2017. During the first five months of 2017, there have been ten proposals submitted which fell under the Nuclear Suppliers Group Part II nuclear dual-use list. Two of those were for temporary export for demonstration and display purposes at an exhibition. Five proposals were approved, one was withdrawn, and four were under review as of late May or early June. Thus, there appears to be an increase in the number of proposals in the first months of 2017. It is unknown if this trend has continued.

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<sup>4</sup> *Third six-month report of the Facilitator on the implementation of Security Council resolution 2231 (2015)*, S/2017/537, June 27, 2017, [http://www.un.org/ga/search/view\\_doc.asp?symbol=S/2017/537&Lang=E](http://www.un.org/ga/search/view_doc.asp?symbol=S/2017/537&Lang=E)

The 16 proposals came from four countries, but about two thirds originated in Germany. Some appear to involve equipment denied by the German government prior to the implementation of the JCPOA but now allowed under the rules of the Procurement Channel. The proposals have involved a range of machine tools, a coordinate measuring machine, frequency changers, capacitors, carbon fiber, and a plunger pump. One proposal, which was approved, involved Russia exporting yellowcake to Iran as payment for Iran providing heavy water to it.

The declared end users for the goods in the 16 proposals, in addition to three for display and demonstration purposes (one of which was withdrawn in 2016), have thus far included the Iranian automobile industry (6), oil and gas industry (2), aluminum cans manufacturing (1), nuclear industry (1), pharmaceutical industry (1), dental industry (1), and cement manufacturing industry (1).

A proposal contemplated by Kazakhstan to supply 950 metric tonnes of natural uranium to Iran was not submitted.<sup>5</sup> The P5+1, according to knowledgeable sources, recommended to Kazakhstan that it not to submit the proposal, as it would not be approved.

Iran and other pariah states have used, among other civilian industries, the automobile, oil and gas, and dental industries as fronts for the illegal acquisition of goods for their nuclear, missile, or arms industries. As such, the proposals need rigorous vetting.

### **Problem of Insufficient Time for Effective Review of Proposals to offer determination of non-military Iranian end users**

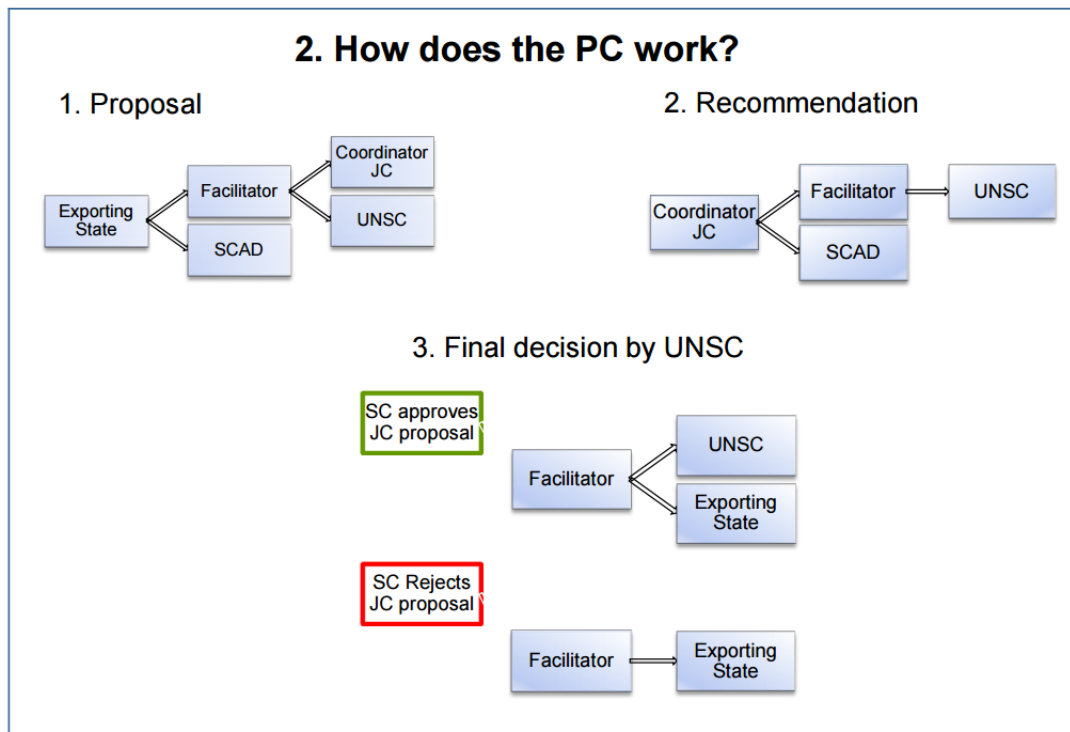
A major weakness of the Procurement Channel provisions in the UNSC resolution and JCPOA is the limited time-frame for action to decide on an export to Iran. The number of entities involved in assessing sales proposals and the short timeline for deciding to approve or disapprove a proposal are fundamental challenges for the Procurement Channel. Figure 1 by the UN Security Council facilitator shows the process of submitting proposals and recommending an action to the Procurement Channel (abbreviated PC). It should be noted that in figure 1, “JC” stands for Joint Commission and includes the PWG (admittedly rather confusing).

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<sup>5</sup> “Iran Plans to Buy Kazakh Uranium Ore, Seek Russia Help to Make Nuclear Fuel,” Reuters. February 25, 2017, <http://www.reuters.com/article/us-iran-nuclear-kazakhstan-russia-idUSKBN1640DO>



## 3.A) PROCUREMENT CHANNEL: PROCEDURE



**Figure 1:** Process of submitting a proposal to the PWG and receiving a recommendation (SCAD=Security Council Affairs = Division; JC=Joint Commission (also denoting Procurement Working Group); UNSC and SC=UN Security Council). Credit: Open Briefing of the UN Security Council Facilitator, Implementation of Security Council Resolution 2231 (2015), New York, March 1, 2016. [http://www.un.org/en/sc/2231/pdf/Facilitator-presentation-Implementation-of-resolution-2231\(2015\).pdf](http://www.un.org/en/sc/2231/pdf/Facilitator-presentation-Implementation-of-resolution-2231(2015).pdf)

The JCPOA Procurement Working Group, which decides by consensus whether to authorize a proposal, has only 20 days, extendable to 30 days (assumed to be actual working days), to deny a proposal and inform the Security Council of its decision; otherwise, the export is approved. This timeframe requires unusually quick investigations of whether a proposal should be blocked, particularly given Iran's on-going commitment to pursue goods abroad illegally for its missile, arms, and perhaps nuclear programs.

A 20- or 30-day timeframe is extremely difficult for PWG state export control and counter-proliferation bureaucracies to manage. Key entities and analysts of countries in the PWG reviewing these export proposals have typically no more than one to five days per agency to review a proposal and determine if it should be blocked, according to interviews with officials from governments of the P5+1. This short timeline for decision making creates an environment of hasty decisions and inadequate time for investigating the end use or end user of goods proposed for a sale and gain assurance that end use checks will be done. Decision making would be even more difficult when a proposed sale is submitted by an Iranian end user that was previously sanctioned or is suspected of being linked to Iran's military or missile industries.

Many Iranian entities are linked to the IRGC and it is difficult to determine whether such linkages indicate goods will go to a nefarious purpose.

## **Challenges of End Use Verification**

Related to the above issue, it is unclear whether many countries will actually send teams to Iran and check the end use of nuclear dual-use goods as allowed by the JCPOA and UNSCR 2231. China, for example, which is less vigilant about proliferation-sensitive exports, may not be diligent about checking the end use of a Procurement Channel-authorized, dual-use good it has sold to Iran. There have been no reported instances of countries conducting end use verification checks of goods sold to Iran to date. Lack of rigorous and regular end use checks would undermine the effectiveness of the Procurement Channel. The P5+1 and international community more broadly must have reasonable assurance that the goods authorized for import by the channel are being used for their stated purposes, including not being diverted to Iran's missile, other military programs, or secret nuclear programs or caches possibly to be used in a surge or break out later. The implementation of a policy of adequate end use verification checks by the selling state or a trusted member of the P5+1 is a critical condition that the Joint Commission must insist on. Inhibiting that goal is the existing language in the JCPOA that limits end use checks of NSG Part II goods to the country supplying the goods. A new formulation is needed to correct this deficiency.

## **Russia has played the role of a disruptive force; has found an ally in China**

Given the short time frames to act to block a proposal, efficiency and speed in the process are critical. According to P5+1 officials, Russia early in the first year of the JCPOA attempted to exploit the lack of clarity about Procurement Channel rules and functions to weaken its effectiveness, and has been supported by China in some of those endeavors. One official accused Russia of attempting to manipulate the whole process. Russia's role overall appears to be one of intervening when desired to complicate the rejection of proposals within the tight guidelines imposed by the JCPOA and to isolate certain sensitive exports from the Procurement Channel process.

When the Procurement Channel was initially being set up, Russia said that proposals should not have to use an electronic form where information is entered online rather than a paper or document form. Western countries wanted to make an electronic form mandatory and Russia disagreed. Electronic forms are common on the internet and used by even small retailers interested in doing internet business. The process to send proposals is akin to buying from a retailer such as Amazon by sending a handwritten purchase order scanned for delivery as an attachment to an e-mail and Amazon having to re-type the information into its information system before filling the order. Impediments to creating an electronic form for proposals are not difficulty or cost. In terms of minimizing mistakes and increasing efficiency, electronic forms are far better. Given their simplicity, they are readily usable. With few proposals, this manual system is manageable but if the number of proposals increases, it may cause problems.

Russia claimed a victory on this issue. Despite the ease of using electronic forms, the United Nations has not required them. On its web site, the United Nations encourages applicants to send proposals by e-mail to [SC-Resolution2231@un.org](mailto:SC-Resolution2231@un.org) using a model application form that would be scanned and e-mailed. The UN office says: “It is helpful to submit the proposals in a machine readable format as this is likely to speed up the review process.”<sup>6</sup> By using such an inefficient method, the United Nations increases the chance of mistakenly entering key data into a UN or state database and delaying assessments of proposals, particularly if the number of proposals increase.

Russia also spearheaded an effort, with Chinese aid, to create exemptions – or no need to use the Procurement Channel – for the Fordow centrifuge plant and the modernization of the Arak reactor. Russia and China are responsible for the renovations at these two sensitive sites. In the case of Fordow, gas centrifuges will be converted to perform the enrichment/depletion of stable, non-uranium isotopes. The first phase of the Russian/Iranian cooperation has involved Russia evaluating how Iran can use existing cascades at Fordow for isotope production. This evaluation is being done in Russia. One notification to the UN Secretariat was of an Iranian delegation going to Russia with regards to technology related to stable isotope production.<sup>7</sup> These visits could allow the transfer of sensitive centrifuge technology relevant to centrifuges for uranium enrichment. Such a transfer could happen in secret and outside the purview of the PWG. In the second phase, Russia will assist Iran to reconfigure the cascades at Fordow for stable isotope separation. Any goods would be exported to Iran in the second phase and would likewise not go through the Procurement Channel; the PWG will only be notified. This will occur similarly in the case of the Arak reactor. The initial design work will be done in China and then the later delivery of parts will be outside the Procurement Channel.

Russia also notified the UN Secretariat on four occasions in 2017 of the transfer of NSG Part I and II goods intended for the Bushehr light water reactors.<sup>8</sup> That brings to a total of six notifications related to light water reactors, in particular related to technology, low enriched uranium in assembled fuel elements, fuel charging and discharging machines, and reactor internals. The exemption of the Bushehr reactor from the PWG is less problematic than the exemptions for Fordow and Arak, which are viewed as more sensitive from a proliferation and misuse point of view.

Since these transfers are not subject to PWG approval, the exemptions undermine the fundamental purpose of the Procurement Channel to control internationally exports of goods to sensitive portions of the Iranian nuclear program. The United States and European countries ultimately acceded to Russia’s and China’s demands that these services should be exempt in

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<sup>6</sup> See “Information on the Procurement Channel,” <http://www.un.org/en/sc/2231/pdf/160113-Information-on-the-procurement-channel.pdf>

<sup>7</sup> Information from knowledgeable official. In addition, the *Third six-month report of the Facilitator* states that one unnamed country notified the PWG in April of an activity related to the necessary modification of the two cascades at the Fordow facility for stable isotope production. This could be related to the same notification in the text.

<sup>8</sup> *Third six-month report of the Facilitator*.

UNSC resolution 2231, which reduces U.S. and European oversight over transfers of goods and services to sensitive nuclear facilities and programs. These exemptions also make it more difficult to gain assurance that illicit transfers will not occur.

Although transfers in the exempted categories must be reported to the Security Council facilitator 10 days in advance, it is possible that Russia and China's reporting will not be complete. Both Russia and China have been lax in enforcing export control laws and sanctions and have proven on many occasions in the UN Panels of Experts on Iran and North Korea that they are willing to block investigations, stonewall the panels on the provision of information, provide misleading or incomplete information, and protect their own nationals from scrutiny. Overall, these exemptions have served to weaken the Procurement Channel and set dangerous precedents for it.

A test run of the Procurement Working Group procedures in December 2015 revealed another issue where Russia's role was disruptive. With regard to missile and conventional military misuse, Iran has tried to argue, with Russian support, that anything military related is not the business of the PWG. This argument would in essence state that the PWG does not have jurisdiction over any exports to Iran's military or missile industries, all of which need a considerable amount of dual-use equipment. Iran appears to be arguing that it will seek to buy banned equipment under a civilian cover, and if caught by the PWG, the PWG can only send the issue to the UN Security Council for a decision. It cannot stop the sale on its own authority. Of course, the United States would be expected to block any approval for a sale at the Security Council. So, in that sense, the Iranian effort will not be successful. However, it could illicitly procure such goods, which is discussed further below. But Iran, with Russian support, may have sought to reduce the PWG's credibility internationally and hinder its operations.

**Disrupting the Handling of Past Denials:** Russia also tried to weaken the way the PWG would handle the issue of previous denials by supplier states of sales to Iran. This effort seeks to subvert a longstanding practice by likeminded bodies, in particular the NSG, to communicate denial information and ensure the most informed decisions about making an export.

An extensive body of information exists about past supplier denials to Iranian entities. These denials have been shared among NSG and Missile Technology Control Regime (MTCR) members. The sharing is called "denial notification" and involves dual-use goods listed on control lists. There are also goods that are denied as part of a "catch-all" condition. They are unlisted goods that are technologically suitable for WMD use. This denial is called "complementary information" and are shared likewise with other suppliers in the NSG. Under the existing system, if a supplier wants to sell the same or a similar good to the denied party, it must go to the denying party and ask why the sale was denied.

Russia proposed to delete all these denials. Given that Iran is still openly committed to illicit procurements for its missile and conventional weapons program and could seek to violate the JCPOA on nuclear-related procurements, Russia's actions are counter-productive and would needlessly weaken the process. Supplier states need to know the existing body of denials in

order to make a sound and timely decision about whether a sale could violate the JCPOA or UNSC resolution 2231. On the PWG application, there should be a place to mark if a denial has occurred and if the new supplier country consulted with the original denying country.

## **Danger of Illicit Missile Procurements**

Iran has openly stated that it will continue illicitly procuring missile and missile-related goods, which it feels is allowed since these items are not explicitly covered by the JCPOA. Iran routinely ignores UN bans on its import of such goods; the international embargo on Iran's import of military related goods remains in effect until Year 5 of the JCPOA, and until Year 8 for missile-related goods, under Resolution 2231.

German intelligence reporting recently found that Iran continued throughout 2016 its attempts to procure goods usable in long-range ballistic missiles capable of delivering nuclear warheads. According to a report from the German state of Baden Wuerttemberg, "Despite the nuclear agreement, Iran is strongly trying to accelerate its development of ballistic carrier systems, for which precise manufacturing devices are necessary." The report went on to provide details about the illicit procurement attempts made by Iran to its companies.<sup>9</sup>

Iran's illicit efforts could happen outside the Procurement Channel, but for certain dual-use goods, they may occur within the Procurement Channel. In the latter case, where Iran actively seeks to deceive the PWG, it may reckon that its chances of success are higher by falsely listing a civilian end use than seeking the goods outside the channel. To the extent that the PWG process is weakened and end use checks are rare, Iran's chances of success are likely to increase. Yet, as indicated by the German intelligence reporting, illicit procurement appears in practice to be the more common means of Iran obtaining missile and military related goods.

High-level Iranian officials have stated that they will not only refuse to heed the UNSCR 2231 ban on missile related imports but also work on missiles, including test launches. This was exemplified by Iran's ballistic missile launches in January and March 2017. The weaker language in resolution 2231 that "calls on" Iran to refrain from missile tests of nuclear-capable missiles has motivated Russia and China to argue, incorrectly, that such launches do not violate the resolution. The United States and allies essentially argue that if the missile falls under category 1 of the Missile Technology Control Regime, which the relevant ones do, then these missiles and any launches are banned.<sup>10</sup> Nonetheless, Russia's and China's legal interpretation

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<sup>9</sup> Verfassungsschutzbericht 2016, Baden Wurttemberg, [http://www.verfassungsschutz-bw.de/site/lfv/get/documents/IV.Dachmandant/Datenquelle/PDF/2017\\_Aktuell/Verfassungsschutzbericht\\_BW\\_2016.pdf](http://www.verfassungsschutz-bw.de/site/lfv/get/documents/IV.Dachmandant/Datenquelle/PDF/2017_Aktuell/Verfassungsschutzbericht_BW_2016.pdf), p. 289 (Translated by Institute for Science and International Security).

<sup>10</sup> The Missile Technology Control Regime Annex Handbook, 2010, states:

*Greatest restraint is applied to what are known as Category I items. These items include complete rocket systems (including ballistic missiles, space launch vehicles and sounding rockets) and unmanned aerial vehicle systems (including cruise missile systems, target drones and reconnaissance drones) with capabilities exceeding a 300 km/500 kg range/payload threshold; production facilities for such systems;*

has led them to block actions at the Security Council to penalize Iran. This problem was underscored by reporting by the UN Resolution 2231 facilitator in June 2017 which described various such arguments made by unnamed (but presumably non-U.S. or EU) representatives of members of the UN Security Council at a meeting to discuss Iran's January ballistic missile launch. Those representatives argued against Security Council action based on this weaker language in the resolution, prompting the facilitator to report, "there was no consensus on how that particular launch related to resolution 2231 (2015)." The pro-strong enforcement member states argued, "the [January 2017 launch] missile was inherently capable of delivering nuclear weapons." In that context, the experts noted that "500 kg has been the approximate mass required to carry a first-generation nuclear weapon and 300 km is an internationally accepted range of strategic significance [i.e. the MTCR guideline.]" The experts concluded that, "in their view, the test constituted an activity related to ballistic missiles designed to be capable of delivering nuclear weapons and was inconsistent with resolution 2231 (2015)."<sup>11</sup>

Unless stronger action is taken, Iran can be expected to continue working on a central and necessary facet of nuclear weapons – perfecting its nuclear-capable missile delivery systems – while only temporarily limiting its nuclear programs, with the *de facto* blessing of Russia and China. This development creates further regional and international insecurity regarding Iran's nuclear weapon intentions. To the extent that the PWG cannot provide assurance that it has blocked missile and military related exports via the Procurement Channel, the PWG's credibility is undermined.

## Need for More Resources for United Nations

The UN Security Council, SCAD, and the UNSC Facilitator are the recipient of proposals from governments on proposed sales by domestic suppliers of nuclear or nuclear dual-use goods to Iran. The United Nations [released sets of guidance](#) for countries on how to submit proposals and what information to include in an application, such as item descriptions and end use authorizations from the Iranian Atomic Energy Organization or from Iran's Ministry of Industry, Trade, and Mine.

There is a need for more outreach by the United Nations to UN member states on the Procurement Channel. Since countries must set up and inform domestic suppliers of proper channels for making a nuclear or nuclear-dual use sale to Iran, broad outreach is key to ensuring countries have adequate time and resources to ensure compliance. There continues to be a rather serious problem of lag time between adequately informing UN member states of their obligations and those states ensuring compliance domestically. The UN facilitator stated

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*and major sub-systems including rocket stages, re-entry vehicles, rocket engines, guidance systems and warhead mechanisms.*

See: [http://mtcr.info/wordpress/wp-content/uploads/2016/04/MTCR\\_Annex\\_Handbook\\_ENG.pdf](http://mtcr.info/wordpress/wp-content/uploads/2016/04/MTCR_Annex_Handbook_ENG.pdf)

<sup>11</sup> Third six-month report of the Facilitator.

in his June 2017 report that, “Eighteen months after Implementation Day, transparency, practical guidance and outreach remain a priority.”<sup>12</sup>

A fundamental challenge is ensuring that companies and governments know when a good requires the approval of the PWG and thus the state’s submission of a proposal to the UN Security Council. In countries that poorly enforce export controls or effectively do not have them—a surprising number of countries – there are real concerns that the companies or authorities will not be able to know when a dual-use good falls inside the Procurement Channel. In countries which Iran has exploited to obtain a wide range of goods illegally for its nuclear and missile programs, the Procurement Channel approach may simply not be implemented or be implemented so poorly as to render it inoperable.

The UN Secretary General does not receive sufficient information about Iran’s procurements. So far, states have limited their sharing of procurement-related information with the Secretary General that is needed to investigate Iranian violations of resolution 2231. The Secretary General has also encountered problems in accessing goods in member states that have been interdicted and prevented from going to Iran under 2231.

## **Compliance and Enforcement is Unclear**

It is unclear whether the Joint Commission and UN Security Council will take a serious line toward issues of Iranian or foreign entities exporting proliferation-sensitive goods to Iran without going through the Procurement Channel or illegitimately using the Procurement Channel. The Atomic Energy Organization of Iran has sought sensitive nuclear-related materials and facilities beyond what it needs or should get. In at least two cases, the requests could have been tests of the JCPOA’s nuclear and nuclear-related goods procurement channel and a supplier country’s ability to police the channel. Under the deal, Iran is viewed as being able to ask for whatever it wants as far as nuclear or nuclear-related goods from overseas and does not have to report the request to the Joint Commission. Although in the two cases referenced, a government detected and made clear its intention to deny the suppliers both exports, Iran could repeat the pattern in other countries, testing other countries’ systems of controls and their processes of submitting requests to the PWG. In this way, this loophole lays the basis for Iran to find less scrupulous suppliers and countries that will eventually make unauthorized sales. Armed with this knowledge, Iran would be far better positioned to find those able and willing to assist secret Iranian illicit procurements of controlled dual-use goods for its nuclear, missile, or other military programs. If a Chinese company, for example, makes a nuclear dual-use sale to Iran, will China take action to ensure the good’s interdiction or its return? If a non-JCPOA state makes such a sale, what can the P5+1 do to motivate that state or other countries in its transit path to intercept the good or require its return? Further, in many cases, detecting such exports or imports will require intelligence information. For example, it may be difficult to know whether the Iranian government has authorized a domestic entity to make a

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<sup>12</sup> *Third six-month report of the Facilitator.*

proliferation-sensitive import outside the Procurement Channel, and it may be able to deny any involvement.

If it is caught making these requests, Iran can claim it is not violating the deal. If it receives any of the controlled goods, it may have violated the JCPOA and its PWG's rules. However, there is no mechanism to demand Iran return ill-gotten goods. Iran can also claim it made the import by mistake or insist that the goods are for a civilian, non-nuclear program and should be treated as an insignificant or nonexistent violation.

The United States should recognize this Iranian practice of seeking goods as inconsistent with the JCPOA and likely intended as a scheme to aid in the violation of the JCPOA and UNSC resolution 2231. It should insist that Iran report any further requests for nuclear or nuclear-related goods to the Joint Commission and Procurement Working Group.

## **Lack of Iranian Export Controls**

According to the JCPOA, "Iran intends to apply nuclear export policies and practices in line with the internationally established standards for the export of nuclear material, equipment and technology (emphasis added)." Iran has not committed to do so, and Tehran could interpret this condition far differently than the United States.

As part of creating a strategic trade control regime in Iran, the United States should also interpret the JCPOA as stating that Iran will commit not to conduct illicit commodity trafficking for government controlled or owned military, missile, nuclear, or other industries and programs, and it will agree to enforce this ban on private Iranian companies. Conducting illicit commodity trafficking is not in line with internationally established standards for strategic trade control systems.

The United States should request via the Joint Commission regular UN reporting on Iran's progress in establishing strategic export controls that meet international standards. The United States and its counterparts in the P5+1 should cooperate with the United Nations Secretariat to ensure that its reporting on Iran's efforts to conduct illicit commodity trafficking for its military, nuclear, missile, or other industries is more fulsome.<sup>13</sup>

## **Iran/North Korean Cooperation**

The United States has sanctioned Iranian and North Korean entities for cooperating on ballistic missiles and conventional weapons, including coordinating shipments of commodities and traveling to share technology and development efforts.<sup>14</sup> There are unverified concerns that

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<sup>13</sup> *Second six-month report of the Facilitator on the implementation of Security Council Resolution 2231 (2015)*, S/2017/49, January 18, 2017.

<sup>14</sup> U.S. Department of Treasury, "Treasury Sanctions those Involved in Ballistic Missile Procurement for Iran," January 17, 2016, <https://www.treasury.gov/press-center/press-releases/Pages/jl0322.aspx>



they may be undertaking nuclear cooperation or transferring nuclear technology, equipment, or materials to each other. It goes without saying that Iran's missile and conventional military cooperation with North Korea also violates UNSC resolutions on North Korea.<sup>15</sup> Any nuclear cooperation that is uncovered would be a breach of the JCPOA.

## **Recommendations**

The following recommendations may reduce Procurement Channel and PWG dysfunction and improve their effectiveness:

### **Procedural reforms that should be undertaken by individual parties**

- The United States and European members of the Joint Commission's Procurement Working Group should adopt a policy of automatic denial of a sales proposal if they have not had adequate time to investigate the end use or end user or have suspicions about either of these. Under the Procurement Channel guidelines, governments can re-submit proposals if they are denied, offering more time for an in-depth investigation. Further, the United States and its allies on the PWG should announce that the sale of any goods to an Iranian trading company will be blocked.
- Particularly given Iran's on-going commitment to illicit trade, reasons for blocking a proposal should include an importer's link in any way to military industries or the IRGC, past illicit procurement activity by the importer or individuals employed there, or lack of adequate assurances on end use verification, including the lack of scheduling of end use visits.
- The United States and its allies should develop a list of commonly sought catch-all goods and distribute it to all UN member states and emphasize that all states should seek PWG authorization for these catch-all goods.
- Previous denials should be clearly marked on any proposal including whether the original denying state has been contacted.
- All states should send any denial information of sensitive goods to the United Nations and the PWG.

### **Regular end use checks are critical**

- The United States and European JCPOA member states should consistently raise the issue of end use checks for authorized sales to Iran with any state that makes them. They should continually pressure states to make these end use visits or encourage the

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<sup>15</sup> United Nations Security Council, *Resolution 1718 (2006)*, S/RES/1718 (2006), October 14, 2006.

IAEA to ask for access to these goods in the course of safeguarding Iran's nuclear program.

### **More fundamental reforms requiring action by the Joint Commission**

- A number of reforms to the procurement conditions of the JCPOA are needed, which would need approval by the Joint Commission:
  - Any member of the PWG should be able to conduct end use checks on nuclear-related dual-use goods sent to Iran. The state must inform the UN Security Council and the IAEA about the outcome of such checks.
  - The period for Procurement Working Group review of submitted proposals should be extended by several weeks.
  - States should be required to report suspected illicit nuclear or nuclear-related procurements to the UN Secretary General. The Secretary General would disseminate these reports to the Joint Commission and IAEA.
  - Steps, including at the Joint Commission, should be taken to require Iran to report to the UN Security Council, which will inform the PWG, of any Iranian requests to foreign suppliers for controlled or sensitive goods. Such requests must be reported whether or not they originated with the AEOI. A request not reported would be considered Iran not meeting its commitments under the Iran nuclear deal.
  - Steps should be initiated to ensure that the Procurement Channel and associated PWG should remain in existence indefinitely, or until the Security Council decides to suspend or end its deliberations.

### **Reforms needed at the United Nations**

- The UN Secretary General should receive a broader mandate to investigate the implementation of, and potential compliance issues related to, UNSC resolution 2231 and any follow-on resolution. Toward that end, member states should share more procurement-related information with the Secretary General and more proactively allow access to goods in member states that have been interdicted and prevented from going to Iran under 2231. Furthermore, the process of placing additional entities on the 2231 sanctions list should be eased.
- The use of electronic forms should be instituted by the UN Secretariat as a new requirement in the proposal process.

- Previous denials should be clearly marked on any proposal including whether the original denying state has been contacted.

### **Outreach needs acceleration**

- Outreach by the United Nations is critical and should be fully supported with the provision of additional financial resources.
- The United States and European JCPOA members should carry out their own outreach campaigns to educate UN member states on the Procurement Channel and other obligations under UNSCR 2231 and remaining national and regional sanctions (as well as those sanctions and resolutions related to North Korea).

### **Iran needs to create a credible domestic export control system**

- The United States should seek via the Joint Commission regular UN reporting on Iran's progress in establishing strategic export controls that meet international standards. The United States and its counterparts in the P5+1 should cooperate with the United Nations Secretariat to ensure that its reporting on Iran's efforts to conduct illicit commodity trafficking for its military, nuclear, missile, or other industries is more fulsome.

### **Exemptions are counterproductive**

- The exemptions for Fordow and the Arak reactor need to be recognized as poor choices that require additional scrutiny, beyond notifications to the United Nations. The United States and European JCPOA members should insist that China and Russia report in detail their intended sales and transfers in these exempted categories to the Joint Commission's Procurement Working Group with the understanding that these reports require verification by the P5+1 and IAEA. If one member state in the PWG disagrees with the transfer or raises an undeclared transfer, that transfer should be blocked or, if tangible, removed from Iran.
- No further exemptions of the Procurement Channel should be given.

### **Stricter enforcement is necessary**

- The Joint Commission and the United States and its partners should institute a method to notify the Financial Action Task Force, financial institutions, and financial regulators of an approved or rejected proposal. The financial sector should treat transactions involving Iran of any high tech dual-use goods that have not been approved by the PWG as subject to extra scrutiny and diligence, and as perhaps illegal.

- Since the only penalty outlined in the JCPOA is full snapback of previous UN Security Council sanctions on Iran, in the case of its involvement in noncompliance, the United States and its allies need to decide on intermediate penalties and how to provide enforcement to prevent and address unauthorized procurements by Iranian and foreign entities. With regard to Iran, penalties could include slowing down or halting approvals, or reducing civil nuclear cooperation, additional sanctions, or if violations of the Procurement Channel persist, the re-imposition of financial sanctions.
- Being in compliance with UNSCR 2231 should include Iran returning any banned goods, including missile or military related goods, which are revealed to have been sent there.
- Illicit procurements by Iran for its military and missile programs should immediately trigger U.S. and EU sanctions.

#### **Blocking Iranian/North Korean cooperation**

- Steps should be taken to explicitly ban Iran from any military, missile, or nuclear cooperation with North Korea or other states deemed to be proliferant states or state supporters of terrorism. Some of these steps should involve U.S. legislative action.

#### **U.S. Congressional action is necessary**

- The U.S. Congress should develop legislation to effectively monitor and enforce the Procurement Channel, as well as to encourage reform in line with the above recommendations.

**ISSUE 3:**  
**NUCLEAR AMBITIONS OF IRAN'S NEIGHBORS STIMULATED AS JOINT  
COMPREHENSIVE PLAN OF ACTION (JCPOA) RESTRICTIONS END**

***Institute Study:***

**Saudi Arabia's Nuclear Ambitions and Proliferation Risks**

**By Sarah Burkhard, Erica Wenig<sup>16</sup>, David Albright, and Andrea Stricker**

**March 30, 2017**

**Executive Summary and Recommendations<sup>17</sup>**

The Kingdom of Saudi Arabia has an uneasy relationship with Iran. The Iran nuclear deal, or Joint Comprehensive Plan of Action (JCPOA), which went into effect in January 2016, has limited Iran's sensitive nuclear program and subjected it to greater international monitoring. Many hoped that the JCPOA would also ease regional security tensions between Saudi Arabia and Iran, yet they have actually increased despite the deal. The JCPOA has also not eliminated the Kingdom's desire for nuclear weapons capabilities and even nuclear weapons, but rather reduced the pressure on Saudi Arabia to match Iran's nuclear weapons capabilities in the short term. In that sense, the deal has delayed concerns about nuclear proliferation in Saudi Arabia.

However, there is little reason to doubt that Saudi Arabia will more actively seek nuclear weapons capabilities, motivated by its concerns about the ending of the JCPOA's major nuclear limitations starting after year 10 of the deal or sooner if the deal fails. If Iran expands its enrichment capabilities, as it states it will do, Tehran will reduce nuclear breakout times, or the time needed to produce enough weapon-grade uranium for a nuclear weapon, to weeks and then days. With these concerns, the Kingdom is likely to seek nuclear weapons capabilities as a hedge. A priority of the administration of Donald J. Trump is to prevent Saudi Arabia from developing such capabilities, in particular acquiring reprocessing and uranium enrichment facilities. The administration's stated commitment to better enforce and strengthen the JCPOA provides a sounder foundation to achieve that goal.

Saudi Arabia has little nuclear infrastructure today, and acquiring nuclear weapons is a difficult process for any country. At this point in time and at its current pace of nuclear development,

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<sup>16</sup> Erica Wenig in particular provided Arabic translations of Saudi statements, press reports, and nuclear research for this report. Former Institute interns Andrew Basham and Stacy Brenner contributed importantly to this report's discussion of security and economic issues with Iran. We also thank Mark Gorwitz, who provided valuable technical references on Saudi Arabia's nuclear and nuclear-relevant research.

<sup>17</sup> The full report is available here: [http://isis-online.org/uploads/isis-reports/documents/SaudiArabiaProliferationRisks\\_30Mar2017\\_Final.pdf](http://isis-online.org/uploads/isis-reports/documents/SaudiArabiaProliferationRisks_30Mar2017_Final.pdf)

Saudi Arabia would require years to create the nuclear infrastructure needed to launch a nuclear weapons effort. Our open source research, which includes translations from Arabic of official Saudi statements, nuclear infrastructure plans, and domestic research, shows that Saudi Arabia is not likely to have launched any domestic covert nuclear programs to create the wherewithal to build nuclear weapons. Instead, like other cases of proliferant states and territories, such as South Africa, Iran, and Taiwan, it appears that Saudi Arabia is concentrating on building up its civilian nuclear infrastructure. It is acquiring nuclear or nuclear-related facilities and committing to placing them under international inspections according to international norms. Saudi Arabia has thus far embarked on a path to seek civil nuclear assistance from several nations, including Russia, South Korea, and China. It is also researching civil nuclear applications and developing a robust nuclear engineering and scientific workforce.

Any research on the weaponization of nuclear material would of course be cause for international alarm, as it was in the case of Iran and its secret program to develop a nuclear weapon. However, preventing proliferation in Saudi Arabia should focus first on preventing enrichment and reprocessing capabilities, even in the absence of work on a nuclear weapon. Nuclear suppliers should reach consensus on not exacerbating security concerns in the Middle East by agreeing not to sell Saudi Arabia sensitive fuel cycle capabilities. Moreover, Western governments should enhance their efforts to monitor, detect, and prevent the illicit spread of enrichment and reprocessing capabilities to Saudi Arabia.

A major uncertainty in this analysis is the nuclear relationship between Pakistan and Saudi Arabia. Although reports that Pakistan has promised Saudi Arabia nuclear weapons appear inaccurate, some level of agreement relating to nuclear cooperation appears likely.

Based on other proliferation cases, unresolved, chronic security concerns can foster nuclear weapons development. For many cases, only the resolution of such concerns led to the avoidance of nuclear weapons. Thus, in the long term, diplomatic and other initiatives should be aimed at regional threat reduction efforts to prevent Saudi Arabia and other Middle Eastern nations from seeking nuclear weapons. Perhaps more important, remedying the relatively short-term nature of the Iran deal's nuclear constraints is critical in preventing Saudi Arabia from building a nuclear weapons capability over the next five to 15 years.

## **Key Findings**

- Saudi Arabia is in the early stages of nuclear development. Saudi Arabia does not possess much nuclear material. It has a Comprehensive Safeguards Agreement (CSA) with the International Atomic Energy Agency (IAEA) which entered into force in 2009. That CSA has an old model Small Quantities Protocol (SQP), which holds certain reporting responsibilities in abeyance until nuclear material inventory exceeds one effective kilogram or the Saudis have a

nuclear facility such as a reactor.<sup>18</sup> At that time, Saudi Arabia will need to negotiate subsidiary arrangements, including facility attachments, which will specify in more detail the reporting requirements and inspection arrangements. As of early 2017, Saudi Arabia has neither power nor research reactors, nor are any under construction. The general belief in the nonproliferation community is that Saudi Arabia is a nuclear ‘newcomer.’

- It is unclear at this point whether Saudi Arabia will sign and ratify the Additional Protocol to its CSA.

- As of 2016, there is no evidence of technical research or development of the production of fissile material, namely highly enriched uranium or separated plutonium. However, a European government official confirmed to our Institute in 2014 that the pursuit of scientific and engineering expertise necessary to take command of all aspects of the nuclear fuel cycle is ongoing in Saudi Arabia.

- Saudi Arabia appears genuinely committed to importing many nuclear reactors and has pursued numerous cooperation agreements with other countries. The country’s declared nuclear focus is on peaceful applications of nuclear energy, affordable power plants, desalination reactors, and environmental protection. According to recent plans, it intends to install over 16 nuclear reactors during the next few decades. This nuclear development program is expected to remain strictly civilian in nature, focused mainly on deploying nuclear power reactors for generating electricity and desalinating sea water. However, it appears on a trajectory to create domestic appendages that could provide a nuclear weapons capability, even if for some time these capabilities would likely be under international safeguards. The conditions necessary for Saudi Arabia to operate unsafeguarded nuclear facilities or leave the Nuclear Non-Proliferation Treaty (NPT) to build nuclear weapons appear onerous today. The disincentives far outweigh the incentives for such a path. However, this could change depending on the fate of Iran’s nuclear program.

- Saudi Arabia has conducted at least one feasibility study on its “involvement in all stages of the nuclear power generation cycle.” According to this study’s results, using Saudi Arabia’s natural uranium deposits to enrich uranium is among the feasible options.<sup>19</sup>

- Although there is no evidence that Saudi Arabia is currently seeking to acquire or build uranium enrichment or reprocessing plants, this could change as its nuclear infrastructure develops and regional tensions fester. Once it establishes its knowledge and industrial base over the next five to 10 years, however, Saudi Arabia will be in a more favorable position to

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<sup>18</sup> The term “one effective kilogram” is used by the IAEA to reflect the mass value of total uranium, e.g. standardizing quantities of natural uranium versus enriched uranium. See IAEA, *Nuclear Material Accounting Handbook*, Services Series 15 (Vienna: May 2008), p. 6, [http://www-pub.iaea.org/MTCD/Publications/PDF/svs\\_015\\_web.pdf](http://www-pub.iaea.org/MTCD/Publications/PDF/svs_015_web.pdf)

<sup>19</sup> Amena Bakr, “Saudi Arabia May Enrich Uranium for Nuclear Power Plants,” *The Daily Star*, June 18, 2010, <http://www.dailystar.com.lb/News/Middle-East/2010/Jun-18/85927-saudi-arabia-may-enrich-uranium-for-nuclear-power-plants.ashx>

decide on building fuel cycle capabilities, albeit under safeguards. A former IAEA inspector interviewed for this paper judged that Saudi Arabia may seek such technologies in as soon as five years.

- Saudi Arabia's interpretation of the NPT appears to include a view of what some have called a "right to enrich." The country has not taken advantage of nuclear energy assistance from the United States, possibly because U.S. reactor purchases would need a so-called 123 agreement stating that Saudi Arabia would "not pursue sensitive nuclear technologies,"<sup>20</sup> which include enrichment and reprocessing.
- Saudi Arabia has expressed interest in developing an indigenous capability to manufacture nuclear reactors. KA.CARE, the national agency at the forefront of Saudi Arabia's nuclear agenda, has identified several steps within the nuclear fuel cycle as having high potential for local manufacturing, including fuel fabrication, processing, and enrichment. Going beyond the import of technologies, Saudi Arabia appears to have intentions to acquire intellectual property rights and become an exporter of small modular reactors (SMRs).
- Saudi Arabia appears to have a domestic supply of uranium sufficient for a small-scale, clandestine nuclear weapons program. However, Saudi Arabia has not yet mined or processed any uranium from its domestic sources.
- Overlooked by many experts evaluating Saudi Arabia's nuclear future is the fact that the country's nuclear workforce is increasing at a rapid pace in both quality and quantity. The academic nuclear engineering sector is growing substantially, constantly launching new graduate programs and expanding Saudi Arabia's five nuclear research centers. Already in 2014 Saudi Arabia considered it had a "high" comparative advantage in "operations and maintenance" of nuclear reactors and a "medium" advantage in other relevant steps.<sup>21</sup>
- The bulk of its published nuclear research is of a theoretical, rather than experimental nature, and it does not involve significant quantities of uranium or other nuclear material. Nevertheless, Saudi Arabia is pursuing front-end nuclear fuel cycle research, such as studies on the extraction of uranium from ore.
- The growth of its academic nuclear energy sector in past years emphasizes the Saudi ambition to modernize and equip the future generation with technical nuclear capabilities.
- Saudi Arabia is highly invested in medical applications of nuclear science, such as gaining hands-on experience with nuclear reactions and housing at least five hot cells of unknown size.

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<sup>20</sup> U.S. Department of State, Office of the Spokesman, "U.S. – Saudi Arabia Memorandum of Understanding on Nuclear Energy Cooperation," May 16, 2008, <https://2001-2009.state.gov/r/pa/prs/ps/2008/may/104961.htm>

<sup>21</sup> Maher Al Odan, Head of Research & Development & Innovation, KA.CARE, "KACARE's Sustainable Energy Initiatives," *PowerPoint Presentation at an IAEA 59th General Conference Side Event*, Vienna, September 16, 2015, [https://www.iaea.org/NuclearPower/Downloadable/Meetings/2015/2015-09-16-NPTDS/6\\_SAUDI\\_Odan\\_SMR\\_GC\\_SE\\_16Sept.pdf](https://www.iaea.org/NuclearPower/Downloadable/Meetings/2015/2015-09-16-NPTDS/6_SAUDI_Odan_SMR_GC_SE_16Sept.pdf)



Hot cells over a certain size are of concern because they could be used in small-scale plutonium separation or irradiated fuel reprocessing experiments. In the case of Iran, hot cells exceeding six cubic meters are banned unless expressly allowed by the executive body of the JCPOA, and allowed ones are subject to IAEA monitoring. Regardless of the size of the Kingdom's hot cells, Saudi Arabia does not currently have any irradiated fuel (or targets) it could use in such experiments. Nonetheless, learning more about these hot cells and limiting the size of any future ones makes sense. In addition, the IAEA should report to member states on its knowledge of these hot cells.

- Official statements by Saudi Arabian officials suggest a commitment to acquire nuclear weapons, or at least advanced nuclear fuel cycle capabilities, in the event that Iran's nuclear program is not adequately constrained by the nuclear deal. Recent statements indicate that officials are for now content with the temporary restrictions on Iran's nuclear capabilities brought by the JCPOA. The opinions of society and prominent Saudi analysts are mixed.
- Under the JCPOA, restrictions on Iran's enrichment program start to conclude from year 10 to 15 of the deal's implementation (or in the period 2026-2031), and Saudi Arabia may again come to fear a renewed Iranian nuclear threat. This threat could be viewed as greater than prior to the agreement due to the international legitimization of Iran's nuclear weapons capabilities under the JCPOA, in particular. If the JCPOA ends prematurely, Iran's actions and those of the United States and UN Security Council to constrain Iran will likely dictate whether the nuclear program is seen as a threat that Saudi Arabia must match.
- It is likely that Saudi Arabia did not pursue nuclear weapons capabilities following the IAEA's discovery of Iran's covert nuclear programs in 2003. The exact reasons why are uncertain, but part of the rationale appears to be that the international community refused to legitimize Iran's enrichment program and instead enacted United Nations Security Council and other unilateral and regional sanctions against Iran. Those actions may have discouraged Saudi Arabia from seeking uranium enrichment technologies out of concern of being stigmatized and possibly subjected to international pressure and sanctions. However, Saudi Arabia's concerns over the Iranian program likely contributed to its decision to pursue nuclear energy projects on a large scale as part of a hedging strategy.
- Unfortunately, the ability of the international community to detect potentially small-scale proliferation-relevant research and development by any nation is questionable, including today in Saudi Arabia. As Saudi Arabia has no major nuclear facilities, the IAEA's familiarity with its research and procurement efforts is limited.
- An on-going concern is that Saudi Arabia may plan to receive nuclear assistance from Pakistan. The Institute uncovered evidence that the assistance would not involve Pakistan supplying Saudi Arabia with a full nuclear weapon or weapons; however, Pakistan may assist in other important ways, such as supplying sensitive equipment, materials, and know-how used in enrichment or reprocessing. An unanswered question is whether Pakistan and Saudi Arabia may be cooperating on sensitive nuclear technologies in Pakistan. In an extreme case, Saudi

Arabia may be financing, or will finance, an unsafeguarded uranium enrichment facility in Pakistan for later use, either in a civil or military program.

· Saudi Arabia secretly purchased a controversial set of ballistic missiles from China in the 1980s, the DF-3 missiles, which can carry nuclear weapons. The United States detected the purchase after the fact. They appear to remain operational.

## **Recommendations**

- 1) When Saudi Arabia brings into full application its CSA with the IAEA, it should also sign and ratify the Additional Protocol.
- 2) Western national intelligence capabilities should focus on the detection of proliferation-relevant Saudi research and development, as well as procurements which could signify covert, or even overt, nuclear fuel cycle development or interest in nuclear weaponization.
- 3) The United States should reaffirm that it is a staunch ally of Saudi Arabia, even while expressing concern about troubling regional and domestic actions, such as its intervention in Yemen and violations of human rights. Doubts about the United States' commitment to assisting the Kingdom's security should nevertheless be removed as part of this policy.
- 4) The United States should make clear to Saudi Arabia in private conversations that its pursuit of uranium enrichment or reprocessing, whether in Saudi Arabia or abroad, would threaten the U.S. defense commitment to Saudi Arabia and destroy it if the Kingdom seeks nuclear weapons. This U.S. policy should happen in parallel with efforts to strengthen and extend, or make permanent, the nuclear limitations of the JCPOA.
- 5) All nuclear suppliers should condition the sale of reactors to Saudi Arabia on a prohibition of domestic reprocessing and enrichment, despite the difficulties of doing so at such a late date.
- 6) The United States and its partners should work diplomatically to discourage the sale of advanced fuel cycle capabilities to Saudi Arabia and its neighbors. As part of that effort, the United States should initiate an effort to guarantee enriched uranium fuel supplies to Saudi nuclear reactors. Although a private U.S. initiative to do so has not succeeded so far, the U.S. government should initiate an effort among reactor suppliers to create an ensured international fuel supply for Saudi and other Middle Eastern countries' reactors. This effort should focus on providing enriched uranium fuel and avoiding mixed (plutonium/uranium) oxide (MOX) fuel.

- 7) Equally, discussions need to be held with countries that are not members of the NSG, such as Pakistan and India, to discourage them from selling advanced nuclear technology and capabilities to Saudi Arabia. Pakistan should be pressed not to conduct any nuclear activities for Saudi Arabia, in Pakistan or abroad.
- 8) A priority is the strengthening of the JCPOA, particularly by better enforcing the deal and extending the duration of the major nuclear limitations. This would prevent a renewed crisis in which Saudi Arabia would be expected to pursue advanced fuel cycle capabilities. A strengthening of the JCPOA would need to mitigate the impact of renewed Iranian enrichment on Saudi threat assessments.
- 9) In the absence of the JCPOA, UN Security Council resolutions against Iran's nuclear program would ostensibly fall back into place. The United States and the international community would need to ensure that Iran's nuclear program does not present a renewed threat to Saudi Arabia by enacting additional sanctions against Iran and instituting containment and deterrence measures, among other actions.
- 10) Regional Middle East tensions must be addressed and threat reduction efforts developed more broadly.

**ISSUE 3, PART II:**  
**NUCLEAR AMBITIONS OF IRAN'S NEIGHBORS STIMULATED AS JOINT  
COMPREHENSIVE PLAN OF ACTION (JCPOA) RESTRICTIONS END**

***Institute Study:***  
**Nuclear Infrastructure and Proliferation Risks of the United Arab Emirates,  
Turkey, and Egypt**

**By Sarah Burkhard, Erica Wenig, David Albright, and Andrea Stricker**

**August 25, 2017**

## **Introduction**

Apart from Saudi Arabia, which our Institute views as currently the largest proliferation risk in the Middle East, three key neighbors of Iran also warrant intensive study as to their nuclear capabilities and plans, safeguards and obstacles to proliferation, and future proliferation risks. After Saudi Arabia, the United Arab Emirates (UAE), Turkey, and Egypt are seen by the Institute as states in the Middle East most poised to seek advanced nuclear capabilities in response to a resurgent nuclear Iran, or as the limitations under the Joint Comprehensive Plan of Action (JCPOA) conclude or otherwise end. Egypt has the most experience of the three in working with nuclear materials and facilities under efforts dating back decades. Turkey may pose the greatest risk as far as surprise proliferation given the state of political affairs in that country and growing impulse of President Erdogan to consolidate power. The UAE, which was the first Middle Eastern country to adopt a so-called “gold standard” of renouncing enrichment and reprocessing, will be a country to watch for reversing course on its pledge. Each of these countries has varying security concerns with regard to Iran, and each has nuanced domestic goals that could propel proliferation attempts. A common recommendation for all three countries is that the United States and its allies should seek strong defensive relationships with those countries potentially affected by the end of JCPOA limits; others include the United States should work to prevent the spread of enrichment and reprocessing capabilities in the region and use national intelligence and diplomatic capabilities to detect and work to reverse proliferation if it emerges. A summary of findings on each country follows, with a technical look at their emerging nuclear capabilities and plans, the security context with regard to Iran, status of their safeguards and obstacles to proliferation, and recommendations for preventing the spread of advanced nuclear capabilities in the region.

## **United Arab Emirates**

### **Summary**

*The United Arab Emirates is often touted as a model country in a region of proliferation concern that has gone to great lengths to assure neighbors about its peaceful nuclear intentions. In 2009, the UAE institutionalized legislative prohibitions to enrichment or reprocessing, reaching a so-called “gold standard” in its nonproliferation commitments.<sup>22</sup> This same legislation criminalized and assigned harsh penalties to “the unauthorized use, theft, transport or trade in nuclear materials.”<sup>23</sup> In light of the Iran deal, however, complications have emerged. The UAE has had to face that under the JCPOA, Iran’s enrichment infrastructure is left in place despite the program first being developed as part of a covert nuclear weapons effort. Worse, the nuclear deal allows Iran to grow its enrichment program to industrial levels following the end of the JCPOA’s restrictions, although the Trump administration is increasingly taking the position that this enrichment buildup will not be allowed. Nonetheless, the UAE has suggested that it must reevaluate its commitments. Edward Royce, Chairman of the House Foreign Affairs Committee, reported that the UAE Ambassador to Washington, Yousef al-Otaiba, told him that the UAE no longer felt bound by its bilateral agreement with the United States, its “123 Agreement” which forgoes enrichment and reprocessing of any U.S.-origin fuel.<sup>24</sup> While subsequent statements from the UAE embassy in Washington, D.C. have indicated that the “government has not formally changed its views or perspective on the 123 Agreement or commitments,” the ambiguity is unsettling for the future of nonproliferation in the region.<sup>25</sup> The UAE is a country to watch to see if it changes its approach on not acquiring or developing advanced nuclear capabilities. Its decisions will likely continue to be influenced by its rivalry with Iran. In any case, any UAE effort to develop enrichment or reprocessing capabilities should be opposed.*

## **Security Context**

The UAE consists of a federation of seven emirates that act with substantial autonomy and maintain separate interests. Two of the emirates, Abu Dhabi and Dubai, have differing relations with Iran, with Dubai holding closer ties and Abu Dhabi remaining more suspicious of Iranian influence. This dynamic may play out with one emirate winning out and largely determining whether the UAE ultimately decides to renege on its nonproliferation commitments and pursue advanced nuclear capabilities. However, Abu Dhabi is the UAE’s largest, most powerful state and seat of UAE leadership and it harbors deep distrust of the Iranian government that stems from fundamental differences in religious ideology. It believes Iran incites unrest among its own and other Arab countries’ Shi’ite populations. Iranian influence in the UAE languished under international economic sanctions, and some Abu Dhabi leaders feared that the lifting of sanctions under the JCPOA would lead to a reconstitution of that influence. If economic

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<sup>22</sup> “UAE Adopts Nuclear Law,” *World Nuclear News*, October 6, 2015, [http://www.world-nuclear-news.org/NP-UAE\\_adopts\\_nuclear\\_energy\\_law-0510095.html](http://www.world-nuclear-news.org/NP-UAE_adopts_nuclear_energy_law-0510095.html).

<sup>23</sup> “UAE Adopts Nuclear Law,” *World Nuclear News*.

<sup>24</sup> Deb Riechmann, “UAE Tells US Lawmaker it Has Right to Enrich Uranium, Too,” *The Associated Press*, October 16, 2015, <http://bigstory.ap.org/article/1c56cae59325422086997619d347d17b/uae-us-lawmaker-we-have-right-enrich-uranium-too>.

<sup>25</sup> “UAE Might Seek Right to Enrich Uranium,” *Al-Jazeera*, October 16, 2015, <http://www.aljazeera.com/news/2015/10/report-uae-seek-enrich-uranium-151016052723467.html>.

relations are reestablished and grow, an increase in Iranian immigration may also occur as Iran seeks to capitalize on economic opportunities in the UAE, which is of concern for leaders.

Dubai, by contrast, has strong economic and cultural ties with Iran, which also played a role in Dubai becoming one of the world's most notorious illicit transshipment hubs that was instrumental to Iran's and Pakistan's secret nuclear weapons efforts. Over 8,000 Iranian traders and businesses are anchored in Dubai, and nearly 10 percent of Dubai's population is ethnic Iranian.<sup>26</sup> This strong economic relationship is largely credited with creating Dubai's booming economy. A state that had been until the 1960s bereft of electricity, roads, running water, or telephones was bolstered by Iranian economic ties and immigrants.<sup>27</sup> This mutually beneficial relationship, however created a serious threat. Dubai became a major conduit through which Iran secretly or illegally imported controlled or sanctioned nuclear and military technologies.<sup>28</sup> Dubai free trade zone companies freely aided Iran's illicit nuclear, missile, and military trade networks until international pressure led the country to create export controls and stronger enforcement.<sup>29</sup>

Although the illicit trade problem remains, it is reduced. The UAE leadership in Abu Dhabi may not have approved of Dubai's close relationship with Iran, but it was swayed by the economic aspect. Many UAE officials see further promise in the prospect of increased economic growth and diversification because of the lifting of sanctions.<sup>30</sup>

The relationship between the UAE and the United States is a complicating factor. The UAE has enjoyed significant military and security benefits from the United States over the past 20 years.<sup>31</sup> Pursuit of advanced nuclear capabilities could damage its economic and military relationships with the United States. It is possible, however, that the UAE would decide to pursue advanced fuel cycle capabilities as a policy of independence and safeguarding against a future, re-energized Iranian nuclear weapons program, citing the precedent of the JCPOA as

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<sup>26</sup> Humeyra Pamuk, "Mideast Money-Sanctions Sap Dubai's Role as Iran Trade Hub," Reuters. February 15, 2012, <http://www.reuters.com/article/2012/02/15/iran-business-dubai-idUSL5E8DC0CE20120215>.

<sup>27</sup> Kambiz Foroohar, "Dubai Helps Iran Evade Sanctions as Smugglers Ignore U.S. Laws," *Bloomberg*, January 25, 2010, [http://www.bloomberg.com/apps/news?pid=newsarchive&sid=av5smtYe\\_DDA](http://www.bloomberg.com/apps/news?pid=newsarchive&sid=av5smtYe_DDA).

<sup>28</sup> Colum Lunch, "Shutting Down Iran's Nuclear Smugglers," *Foreign Policy*, July 1, 2015, <http://foreignpolicy.com/2015/07/01/shutting-down-irans-tehran-nuclear-smugglers-security-council-united-nations/>.

<sup>29</sup> See for example: Andrea Stricker, "Case Study: Two Arrested in Iranian Aircraft Parts Trafficking Scheme, Result of U.S. Sting Operation," Institute for Science and International Security Report, December 7, 2016, <http://isis-online.org/isis-reports/detail/case-study-two-arrested-in-iranian-aircraft-parts-trafficking-scheme/>; David Albright and Andrea Stricker, "If You Give a Mouse a Cookie," Institute Report, September 28, 2015, [http://isis-online.org/uploads/isis-reports/documents/Iran\\_Prisoner\\_Swap\\_28Sept2015-Final.pdf](http://isis-online.org/uploads/isis-reports/documents/Iran_Prisoner_Swap_28Sept2015-Final.pdf); David Albright, Paul Brannan and Andrea Scheel, "A Smuggler's Procurement of Nuclear Dual-Use Pressure Transducers for Iran," Institute Report, July 14, 2009, [http://www.isisnucleariran.org/assets/pdf/Yadegari\\_Iran\\_illicit\\_trade\\_14July2009.pdf](http://www.isisnucleariran.org/assets/pdf/Yadegari_Iran_illicit_trade_14July2009.pdf)

<sup>30</sup> Andrew Torchia, "Billions Up for Grabs if Nuclear Deal Opens Iran Economy," Reuters. April 3, 2015, <http://www.reuters.com/article/us-iran-nuclear-economy-idUSKBN0MU0QP20150403#tHMOJLraO2YljzhY.97>.

<sup>31</sup> "UAE-US Security Relationship," *Embassy of the United Arab Emirates*, [http://www.uae-embassy.org/uae-us-relations/security\\_2012](http://www.uae-embassy.org/uae-us-relations/security_2012).

international approval of its right to enrich. Such a move would put the United States in a difficult position.

Regarding a broader push toward nuclear weapons capabilities, the UAE's economy is reliant on oil and natural gas exports which account for roughly 40 percent of its GDP.<sup>32</sup> As such, the UAE would be highly vulnerable to energy sanctions from the international community. Pursuit of advanced fuel cycle capabilities or nuclear weapons could carry with it substantial security and economic costs. This prospect will likely play a role in the UAE's calculus when deciding how far to go in matching Iran's nuclear capabilities, as will the perception level of a U.S. security commitment to the UAE.

### **Current Plans and Capabilities**

By the year 2020, domestic energy demands of the UAE are projected to more than double.<sup>33</sup> As a result, the UAE has begun to expand and diversify its energy sources, and set a goal to have nuclear energy supply 6 percent of its energy demand by 2050.<sup>34</sup> Its first nuclear power reactor is nearing completion.<sup>35</sup> Its nuclear program has steadily progressed compared to other programs, having started discussing a nuclear power program in 2008 to accommodate projected increases in electrical demand and for desalination purposes.

Through extensive cooperation with the International Atomic Energy Agency (IAEA) and international partners, the UAE progressed relatively quickly in its endeavor to lay its nuclear infrastructure. It first created institutions to oversee and regulate nuclear development, starting with the Federal Authority of Nuclear Regulation (FANR) in 2009, followed by the Nuclear Energy Program Implementation Organization, which established the Emirates Nuclear Energy Corporation (ENEC) the same year to "evaluate and implement nuclear power plans."<sup>36</sup> The ENEC accepted a \$20 billion dollar bid from the Korean Electric Power Corporation (KEPCO) to design and build four APR<sup>37</sup> 1400 megawatt-electric (MWe) pressurized water reactors.<sup>38</sup> The construction of the four reactors called Barakah 1-4 in the coastal town Ruwais in Abu Dhabi is going well, with construction progress at 94%, 82%, 68%, and 41%, respectively, according to a statement by the Emirates Nuclear Energy Corporation.<sup>39</sup> Barakah 1 is projected

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<sup>32</sup> "UAE Facts and Figures," OPEC, [http://www.opec.org/opec\\_web/en/about\\_us/170.htm](http://www.opec.org/opec_web/en/about_us/170.htm).

<sup>33</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*, updated May 2017, <http://www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/United-Arab-Emirates/>

<sup>34</sup> "UAE to invest \$163bn in renewable-energy projects," *Al-Jazeera*, January 10, 2017, <http://www.aljazeera.com/news/2017/01/uae-invest-163b-renewable-energy-projects-170110160613154.html>

<sup>35</sup> "Barakah-1," IAEA, *Power Reactor Information System*, updated March 26, 2017, <https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=AE>

<sup>36</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*.

<sup>37</sup> APR-1400 is the name of the model, where APR stands for Advanced Power Reactor and 1400 indicates the electricity output.

<sup>38</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*.

<sup>39</sup> "Construction Program," Emirates Nuclear Energy Corporation, accessed March 27, 2017, <https://www.enec.gov.ae/barakah-npp/construction-program/>

to be operational by 2018;<sup>40</sup> the other three are projected to be operational by 2020.<sup>41</sup> Early concerns of delays were based on the fact that construction of two APR-1400s in South Korea experienced delays (Shin Kori 3 and 4).<sup>42</sup> However, Shin Kori 3 eventually began operation in December 2016, and Shin Kori 4 is expected to follow.<sup>43</sup> In October 2016, KEPCO agreed to invest \$90 million in a company that will operate the UAE's first nuclear power plant.<sup>44</sup>

The four Barakah reactors will be jointly operated by the UAE and KEPCO personnel for 60 years, which is the expected lifespan of the reactors.<sup>45</sup> To fulfill its front end nuclear fuel cycle requirements, the UAE established a vast network of international partners to ensure smooth operation of the reactors. It will purchase natural uranium externally, deliver this uranium to contracted partners for conversion and subsequent enrichment, and finally send the enriched product to KEPCO for fuel fabrication.<sup>46</sup> In 2012, FANR and six companies signed agreements to supply uranium for 15 years: Conver Dyn, Uranium One, Urenco, Rio Tinto, Tenex, and Areva.<sup>47</sup> The APR-1400 uses low-enriched uranium dioxide fuel, with an average enrichment of 2.6 % U-235.<sup>48</sup> Each reactor has a net capacity of 1345 MWe and a thermal capacity of 3983 megawatts-thermal (MWt).<sup>49</sup> The high burn-up of the spent fuel adds to the proliferation resistance of the reactors, as high burn-up decreases the amount of plutonium 239, which is the most desirable plutonium isotope for nuclear weapons, and increases the amount of undesired plutonium 240 to more than 25 percent.<sup>50</sup> Moreover, given that the reactors will be jointly operated with South Korea and inspected by the IAEA, the UAE would face difficulties in secretly diverting spent fuel in a hypothetical attempt to collect and recover plutonium in a

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<sup>40</sup> Caline Malek, "Construction of UAE's First Nuclear Reactor Complete but Operation Delayed to 2018," *The National*, May 5, 2017, [https://www.thenational.ae/uae/government/construction-of-uae-s-first-nuclear-reactor-complete-but-operation-delayed-to-2018-1.42360?mkt\\_tok=eyJpIjoiTURFd09EVXdaV1kyTWpVMylsInQiOiJPSXgyYVFPVHBsbSt6ZFZZWVpWXC82WVlhYzJ6UTZMWkZkbTNDZkMzaWxsYzArcktSZ0pqQ1dNXc9VeXQrRDh4M3dyTVlVaHduNmtvMkRlaFFldWFmcHpYSilxMGhJNVmwZ0U3KzhOdW4zXC9laHZNtIpVjZiYVhqVllyelpHSEtLdCJ9](https://www.thenational.ae/uae/government/construction-of-uae-s-first-nuclear-reactor-complete-but-operation-delayed-to-2018-1.42360?mkt_tok=eyJpIjoiTURFd09EVXdaV1kyTWpVMylsInQiOiJPSXgyYVFPVHBsbSt6ZFZZWVpWXC82WVlhYzJ6UTZMWkZkbTNDZkMzaWxsYzArcktSZ0pqQ1dNXc9VeXQrRDh4M3dyTVlVaHduNmtvMkRlaFFldWFmcHpYSilxMGhJNVmwZ0U3KzhOdW4zXC9laHZNtIpVjZiYVhqVllyelpHSEtLdCJ9); Adam Vaughan, "Foreign companies flock to build nuclear plants in the UK," *The Guardian*, March 25, 2017, <https://www.theguardian.com/business/2017/mar/25/foreign-firms-flock-to-build-nuclear-plants-in-uk>

<sup>41</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*.

<sup>42</sup> Anthony McAuley, "UAE Nuclear Project Enters Critical Phase," *The National*, July 7, 2015 <http://www.thenational.ae/business/energy/uae-nuclear-project-enters-critical-phase>.

<sup>43</sup> "First Korean APR-1400 enters commercial operation," *World Nuclear News*, December 20, 2016, <http://www.world-nuclear-news.org/NN-First-Korean-APR-1400-enters-commercial-operation-2012164.html>

<sup>44</sup> "S.Korea Signs on to Venture to Operate UAE's 1st Nuclear Power Plant," Reuters Africa. October 20, 2016, <http://af.reuters.com/article/energyOilNews/idAFL3N1C32ZG>

<sup>45</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*.

<sup>46</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*.

<sup>47</sup> "UAE Signs Six Deals for Uranium Supply in 2012," *UAE Interact*, December 19, 2012, [http://www.uaeinteract.com/docs/UAE\\_signs\\_six\\_deals\\_for\\_uranium\\_supply\\_in\\_2012/52462.htm](http://www.uaeinteract.com/docs/UAE_signs_six_deals_for_uranium_supply_in_2012/52462.htm)

<sup>48</sup> Han-Gon Kim, "The Design Characteristics of Advanced Power Reactor 1400," IAEA-CN-164-3S09.

<sup>49</sup> IAEA, "Barakah-1," *IAEA Power Reactor Information System*, updated March 26, 2017, <https://www.iaea.org/PRIS/CountryStatistics/CountryDetails.aspx?current=AE>

<sup>50</sup> IAEA, "Status report 83 - Advanced Power Reactor 1400 MWe (APR1400)," April 11, 2011, <https://aris.iaea.org/PDF/APR1400.pdf>



reprocessing plant, regardless of plutonium quality.<sup>51</sup> The UAE plans to store all spent fuel in a national repository designed with the assistance of the Swedish Nuclear Waste Management Corporation or delivered to France for reprocessing.<sup>52</sup> The latter, if implemented, is bound to be seen by many U.S. experts and officials as inconsistent with the Gold Standard. One issue will be the fate of the separated plutonium, and whether overseas reprocessing will encourage the UAE to start using plutonium-based fuels in its power reactors, as is common in France. These fresh plutonium-bearing fuels, called mixed oxide (MOX) fuels, pose a much more serious proliferation risk than spent fuel or low enriched uranium fuels.

The IAEA has taken measures with the UAE to develop the necessary human capital for a sustainable nuclear program by providing many scholarships and opportunities for on-the-job training, as well as introducing nuclear science courses at universities at the Bachelors, Masters, and doctorate levels.<sup>53</sup> An emphasis on English proficiency will also be important as the workplace language will be English.<sup>54</sup> Since KEPCO will help operate the plant for 60 years, the UAE has sufficient time to create a domestic infrastructure through its international partnerships.

The nonproliferation gold standard pledged by the UAE on forgoing enrichment and reprocessing faces a challenge particularly if the enrichment restrictions on Iran under the JCPOA start to end. In 2017, at the Carnegie Nuclear Policy Conference, UAE Ambassador to the United States Yousef al-Otaiba publicly raised the UAE's situation, expressing that Iran got a "better" deal than the UAE, as it was able to keep its enrichment capacity.<sup>55</sup> He stated: "...If you're sitting where we're sitting, the country that is largely unfriendly to the United States and the West seems to have gotten a better deal... I offer this as just a perspective of how the deal looks, not on the technical merits but as friends and adversaries go." This regional dynamic requires monitoring particularly in light of worsening UAE/Iran relations and any signs that the UAE could move to abandon its pledge not to reprocess or enrich.

It is worth noting too that the UAE has purchased arms and missiles from North Korea, despite its condemnations of North Korea's nuclear tests and missile launches. This could indicate or further facilitate the emergence of a problematic back channel for the UAE to obtain advanced

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<sup>51</sup> Although a high fraction of plutonium 239 is desirable to those making nuclear weapons, any plutonium, even low quality power reactor plutonium, can be used to make nuclear weapons, with tradeoffs in explosive yield, heat management, and the risk of premature detonation.

<sup>52</sup> "Nuclear Power in the United Arab Emirates," *World Nuclear Association*.

<sup>53</sup> Elisabeth Dyck and Ayhan Evrensel, "From Consideration to Construction: The United Arab Emirates' Journey to Nuclear Power: A Country Case Study," IAEA, February 3, 2015, <https://www.iaea.org/newscenter/news/consideration-construction-united-arab-emirates-journey-nuclear-power>.

<sup>54</sup> McAuley, "UAE Nuclear Project."

<sup>55</sup> "Plenary – The Iran Deal: International Perspectives," *2017 Carnegie Nuclear Policy Conference*, transcript, [http://carnegieendowment.org/2017/03/20/plenary-iran-deal-international-perspectives-pub-67681?mkt\\_tok=eyJpIjoiTlRrNVl6SmtNREEzTmptsailsInQiOiJheSt4ZE5JcnhcL3MyZmJwOFZvVkhUb09oakwrR1V4dnU1aXBBY1R6c3QrWfWvbUxMZk1SOHhEK2Mya3dGbU9uaktQaUhlb3IzVFJiMEpUbFZuZDZPZ1Nza2taNnhjZHB6YUlzOWt5bTZ6RE5CU1JXSzJMcXlZnV4NGZqTWZPRzZPln0%3D](http://carnegieendowment.org/2017/03/20/plenary-iran-deal-international-perspectives-pub-67681?mkt_tok=eyJpIjoiTlRrNVl6SmtNREEzTmptsailsInQiOiJheSt4ZE5JcnhcL3MyZmJwOFZvVkhUb09oakwrR1V4dnU1aXBBY1R6c3QrWfWvbUxMZk1SOHhEK2Mya3dGbU9uaktQaUhlb3IzVFJiMEpUbFZuZDZPZ1Nza2taNnhjZHB6YUlzOWt5bTZ6RE5CU1JXSzJMcXlZnV4NGZqTWZPRzZPln0%3D)

nuclear technologies if it decided to proliferate.<sup>56</sup> This information also demonstrates that the UAE is willing to pursue illicit trade if it suits the government's interests.

## Research and Training

As of March 2017, *Web of Science*, a database of published scientific research, had collected only 16 publications affiliated with Emirati research institutions addressing “uranium” within the past 15 years. Iran, in comparison, had produced 412 publications. Of the 16 publications, not one was written independently, or without collaboration of other nations' institutions. Most cooperation appears to be with China and the United States.

International cooperation is necessary in part because the UAE does not have any major nuclear research centers. The UAE's main nuclear body is the above-mentioned FANR, which is responsible for “safety, security, radiation protection and safeguards” of the UAE's nuclear power reactors. FANR is also the main overseer of the implementation of international agreements, which include the U.S. 123 agreement.<sup>57</sup> The FANR website shows a high degree of intended transparency for its future nuclear program. Under a web site tab titled “Open Data,” inspection reports of the Barakh Nuclear Power Plant are available.<sup>58</sup> As an example, one can identify that the inspection team from the December 2016 Barakah report consisted of 24 individuals. Based on evaluating their names and affiliations, roughly one third of the people appear to come from organizations outside the UAE.<sup>59</sup> In fact, 40 percent of FANR employees are not Emirati.<sup>60,61</sup>

It is unlikely, but unclear from this open source evaluation, whether FANR hosts any laboratories. A section for “Research and Studies” exists on its website but is lacking any publications as of April 2017.<sup>62</sup> As indicated by publications found in scientific databases, the UAE's concrete, experimental research seems primarily conducted within general science departments of universities or other academic institutions. Examples are the Departments of Geology, Physics, and Chemistry at United Arab Emirates University (UAEU) and the

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<sup>56</sup> Samuel Ramani, “Why Did the UAE Purchase Weapons from North Korea?” *The Diplomat*, August 8, 2017, <http://thediplomat.com/2017/08/why-did-the-uae-purchase-weapons-from-north-korea/>

<sup>57</sup> “About FANR,” Federal Authority for Nuclear Regulation, Web page, Accessed April 2017, <https://fanr.gov.ae/en/about-us/about-fanr>

<sup>58</sup> See: “Open Data,” Federal Authority for Nuclear Regulation, Web page, Accessed April 2017, <https://fanr.gov.ae/en/open-data>

<sup>59</sup> FANR, *Nuclear Facility Inspection Report*, December 2016, <https://fanr.gov.ae/en/Lists/InspectionReports/Attachments/88/00062-2017%20December%20report%20EN.pdf>

<sup>60</sup> According to Reuters, the ratio of non-citizens to Emiratis is more than five to one, implying that less than 20 percent of the population is Emirati. Mahmoud Habboush, “Call to naturalise some expats stirs anxiety in the UAE,” Reuters. October 10, 2013, <http://uk.reuters.com/article/uk-emirates-citizenship-feature-idUKBRE99904J20131010>

<sup>61</sup> “FANR in Numbers,” Federal Authority for Nuclear Regulation, Web page, Accessed April 2017, <https://fanr.gov.ae/en>

<sup>62</sup> See: “Research and Studies,” Federal Authority for Nuclear Regulation, Web page, Accessed April 2017, <https://fanr.gov.ae/en/open-data/researches-studies>

Department of Geology at Al Ain University of Science and Technology. Additionally, research is conducted at the Dubai Central Laboratory, which integrates seven major research departments into one, ranging from Food and Environment to Electromechanics Departments.<sup>63</sup>

As of September 2016, UAEU is approved to use radioactive material for “nuclear research, nuclear physics, and other types of research involving radioactive material.”<sup>64</sup> This makes it possible that new equipment like hot cells could eventually be installed at the UAEU.

Khalifa University for Science, Technology and Research (KUSTR) in Abu Dhabi, which is merging with the Petroleum Institute and the Masdar Institute, has a nuclear engineering department.<sup>65,66</sup> These two other institutions have participated in nuclear-related research.<sup>67</sup>

### **Safeguards and Proliferation Obstacles**

Due to extensive international involvement in the UAE’s nuclear program by the IAEA, KEPCO, and uranium providers, it would be difficult for the UAE, without declaring a reversal of its gold standard commitments and voiding its legislation, to shift efforts to build front or back-end fuel cycle capabilities. The UAE would likely also face Nuclear Suppliers Group (NSG) opposition to any efforts to acquire enrichment or reprocessing facilities. It is, however, not certain that the NSG would block such purchases. Proposed NSG guidelines asking suppliers to consider “[g]eneral conditions of stability and security” within the recipient’s state and the state’s region before agreeing to the transfer of any material, for example, are blocked by certain members, including Turkey.<sup>68</sup>

Any secret effort by the UAE to develop advanced fuel cycle capabilities would likely be detected, resulting in international pressure. Moreover, the safeguards in the UAE are extensive and would complicate any secret nuclear effort. The IAEA has established comprehensive verification measures to which the UAE has voluntarily complied, including the Additional Protocol. The four Barakah nuclear reactors will be jointly owned and operated by KEPCO personnel for 60 years, further impeding any secret diversion from them. Finally, the

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<sup>63</sup> “About Us – Dubai Central Laboratory Introduction,” Government of Dubai, Web page, Accessed August 2017, <http://bit.ly/2vgn8SK>

<sup>64</sup> “UAEU students train in nuclear research,” United Arab Emirates University, News Archive, September 2016, [http://www.uaeu.ac.ae/en/news/2016/september/nuclear\\_research.shtml](http://www.uaeu.ac.ae/en/news/2016/september/nuclear_research.shtml)

<sup>65</sup> “Abu Dhabi approves merger of universities and billions in projects,” *The National*, October 13, 2016, <https://www.thenational.ae/uae/government/abu-dhabi-approves-merger-of-universities-and-billions-in-projects-1.192240>

<sup>66</sup> “College of Engineering,” Khalifa University, Web page, Accessed August 2017, <http://www.kustar.ac.ae/pages/college-of-engineering>

<sup>67</sup> “Abu Dhabi approves merger of universities and billions in projects.”

<sup>68</sup> Daniel Horner, “NSG Revises Rules on Sensitive Exports,” *Arms Control Today*, August 2011, <http://search.proquest.com.ezproxy.vccs.edu:2048/docview/884218279/2ADC40EC266E4043PQ/1?accountid=12902>

UAE has no significant domestic uranium resources and would require imported uranium in order to undertake a parallel covert fuel cycle effort.<sup>69</sup>

If an enrichment or reprocessing program is sought by the UAE during the next two decades, it would need to change its domestic regulations forbidding uranium enrichment or reprocessing and the 123 agreement with the United States. However, the UAE is far from establishing mastery or independent control of either the front or back-end of the nuclear fuel cycle. If it pursued them alone, the UAE would require many years to acquire the technical equipment and expertise required to engage in successful enrichment, and may have to engage in secret, illicit procurements to acquire all the necessary goods and know-how. North Korea could even emerge as a supplier for such goods. Alternatively, the UAE could decide, particularly if Iran succeeds in scaling up its enrichment program, to seek to modify the Gold Standard commitments and buy enrichment or reprocessing capabilities from an overseas supplier and subject these facilities to IAEA safeguards. This situation, if allowed to develop, would enable the UAE to develop a nuclear weapons capability and open the door for breaking out to nuclear weapons at a time of its choosing, perhaps faster than the international community could react to stop it.

## **Conclusion**

Because of the risk of advanced nuclear capabilities proliferating in the Middle East, all nuclear suppliers should commit not to supply the UAE enrichment or reprocessing capabilities, including reprocessing UAE spent fuel abroad unless the plutonium is not returned. The United States should make clear its defensive commitment to the UAE but underscore that any pursuit of uranium enrichment or reprocessing would threaten the U.S. defense commitment. National intelligence capabilities should monitor any UAE efforts to renege on its commitment to not acquire advanced fuel cycle capabilities and look for signs that it is carrying out research on weaponization. In addition, any increase in Iran's enrichment or reprocessing capabilities beyond current levels should be opposed as stimulating nuclear proliferation and posing an unacceptable risk to the region. The United States should work to strengthen the JCPOA by better enforcing the deal and extending the duration of the major nuclear limitations in order to address the security concerns of allies such as the UAE. The United States should also continue pressuring the UAE on its commitment to strong enforcement of its export controls and prevention of illicit trade to Iran. Middle East security concerns should be addressed and threat reduction efforts should be pursued more broadly.

## **Turkey**

### **Summary**

*The risk is substantial that Turkey will seek advanced nuclear capabilities in order to have comparable power to Iran under ambitious nuclear energy plans laid by President Recep Tayyip*

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<sup>69</sup> IAEA, Analysis of Uranium Supply to 2050, STI/PUB/1104, May 2001.

*Erdogan. Erdogan's increasingly dictatorial actions increase the risk that Turkey will seek nuclear weapons capabilities – tools that Erdogan may find useful for consolidating power and augmenting Turkey's regional power status. Turkey is also adamant about making its nuclear infrastructure as independent from foreign aid as possible, as soon as it has acquired the needed workforce and technology. Turkey's interpretation of the Nuclear Non-Proliferation Treaty (NPT) as granting a "right to enrich" and its resistance to tightened Nuclear Suppliers Group (NSG) restrictions on transfers of enrichment and reprocessing technology are strong indicators of a desire to keep open the possibility of advanced fuel cycle development. Therefore, although official statements deny Turkish plans to acquire enrichment capabilities, NSG member states should block any attempts by Turkey to import technology that would support enrichment facilities and further destabilize the Middle East. National intelligence agencies should watch for any signs of illicit efforts by Turkey to procure these or weaponization knowledge and capabilities.*

If Iran develops nuclear weapons, Turkey has said in the past that it would "follow suit - immediately," according to remarks by a high-level Turkish foreign ministry official.<sup>70</sup> More recently, in March 2017, an imam and confidant of Erdogan expressed the need for Turkish nuclear weapons and insisted on "inventing these weapons, not buying them."<sup>71</sup> A Turkish journalist also recently claimed that officials in Erdogan's inner circle informed him of secret plans and discussions to acquire nuclear weapons for deterrence purposes, and in reaction to worsening relations with the West.<sup>72</sup> Turkey would be able to acquire nuclear weapons more quickly if it is able to develop sensitive fuel cycle capabilities while the Iran nuclear deal, or Joint Comprehensive Plan of Action (JCPOA), is in place. But Turkey appears to lack as strong of a drive to match Iran's current nuclear capabilities as Saudi Arabia possesses. Part of the reason is that Turkey reportedly still hosts an estimated 50 U.S. nuclear weapons under its NATO arrangement and is by most accounts satisfied with the protection provided by the extended deterrent.<sup>73</sup> Despite the attempted military coup in July 2016, during which Incirlik Air Base hosting the weapons played a critical role, the weapons seemed to remain secure based on publicly available accounts. Media reports that the nuclear weapons were transferred to Romania were denied by the Romanian government.<sup>74</sup> Moreover, Turkey has important trade relations with Iran, and despite contentious foreign policies issues, the two have not engaged in

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<sup>70</sup> Alexandra Bell, "Turkey's Nuclear Crossroads," *Good Magazine*, August 26, 2009, <http://magazine.good.is/articles/turkeys-nuclear-crossroads>

<sup>71</sup> Zoie O'Brien, "Nuclear Turkey? Imam close to Erdogan calls for weapons now amid tensions with EU," *Express*, March 16, 2017, <http://www.express.co.uk/news/world/780240/TURKEY-Imam-Erdogan-nuclear-weapons-NOW-EU-tension-Germany-Netherlands>

<sup>72</sup> Rebecca Flood, "Turkey is Trying to Get an Atomic Bomb in Secret Weapons Plan, Warns Expert," *Express*, August 8, 2017, <https://www.express.co.uk/news/world/838694/Turkey-atomic-bomb-Recep-Tayyip-Erdoğan-nuclear-weapon-fears/amp>

<sup>73</sup> Robert S. Norris and Hans M. Kristensen, "U.S. Tactical Nuclear Weapons in Europe, 2011," *Bulletin of the Atomic Scientists*, Vol. 67, Issue 1, p. 69, January/February 2011,

<sup>74</sup> Georgi Gotev and Joel Schalit, "US moves nuclear weapons from Turkey to Romania," *Euractiv*, August 18, 2016, <https://www.euractiv.com/section/global-europe/news/us-moves-nuclear-weapons-from-turkey-to-romania/>

combat for hundreds of years.<sup>75</sup> Turkey has tried to maintain a good economic and diplomatic relationship with Iran, speaking against economic sanctions and promoting a nuclear fuel swap agreement with Iran in 2010.<sup>76</sup> President Erdogan and Turkey's finance minister also spoke positively about the JCPOA, respectively calling it "an important development for peace in the region"<sup>77</sup> and "'great news' for the Turkish economy."<sup>78</sup> Nonetheless, Turkey could develop nuclear weapons capabilities simply to be a competitive power in the region, as a means of Erdogan coalescing his power, and to remain comparable to Iran.

Turkey can be expected to pursue its nuclear energy independence and its perceived "right to enrich" while balancing its increasingly troubled ties with the West. It would be subject to additional Western pressure to maintain a peaceful nuclear program if it does manage to acquire advanced fuel cycle capabilities. After the attempted military coup in July 2016, Erdogan removed all identified "adversaries" from military and political ranks and is therefore unlikely to face any substantial challenges in future decision making, even if it would turn the international community against Turkey. Erdogan would need to decide whether Western sanctions and pressure would be worth a push toward developing nuclear weapons capabilities and eventually nuclear weapons. The attempted coup revealed Turkey's political instability, which makes it a risky place for sensitive nuclear programs (and potentially NATO stationed nuclear weapons), even if a program is strictly civilian in nature.

### **Current Plans and Capabilities**

Turkey's energy demand is increasing rapidly, and due to its lack of natural resources, its two main options are to keep importing fossil fuels or to invest in alternative energy sources, including nuclear energy. Erdogan is opting for a smooth but steady transition from the former to the latter; the government is planning to have nuclear power provide five percent of the nation's energy demand by 2023, and 15 percent by 2030.<sup>79</sup> The International Energy Agency's (IEA's) recommendation is five percent by 2020.<sup>80</sup>

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<sup>75</sup> This is despite supporting differing military and political objectives in neighboring Syria. See Ali Omid, "If it ain't broke, don't fix it: Why Turkey and Iran's 376 years of peace will continue," *Al-Monitor*, December 22, 2015, <http://www.al-monitor.com/pulse/originals/2015/12/iran-turkey-tension-syria-yemen-iraq.html#ixzz3wI0PMzMS>; Nader Habibi, "Turkey and Iran: Growing Economic Relations Despite Western Sanctions," *Middle East Brief*, Brandeis University, May 2012, No. 62, <http://www.brandeis.edu/crown/publications/meb/MEB62.pdf>

<sup>76</sup> Parisa Hafezi, "Turkey, Brazil seal deal on Iran nuclear fuel swap," Reuters. May 16, 2010, <http://www.reuters.com/article/2010/05/16/us-iran-nuclear-deal-idUSTRE64F29P20100516>

<sup>77</sup> "Erdogan speaks with Iran's Rouhani, welcomes nuclear deal," *Today's Zaman*, July 17, 2015, [http://www.todayszaman.com/anasayfa\\_erdogan-speaks-with-irans-rouhani-welcomes-nuclear-deal\\_393928.html](http://www.todayszaman.com/anasayfa_erdogan-speaks-with-irans-rouhani-welcomes-nuclear-deal_393928.html)

<sup>78</sup> Daren Butler and Tulay Karadeniz, "Turkey welcomes Iran deal, urges Tehran to rethink regional policies," Reuters. July 14, 2015, <http://www.reuters.com/article/iran-nuclear-turkey-idUSL5N0ZU3XE20150714>

<sup>79</sup> Salih Sari, Nuclear Engineer, MSc., The Ministry of Energy & Natural Resources, "Current Status of Nuclear Power Program in Turkey," *PowerPoint Presentation at "Technical Meeting on Country Nuclear Power Profile,"* Vienna, May 10-13, 2016, [https://www.iaea.org/NuclearPower/Downloadable/Meetings/2016/2016-05-10-05-13-NPES/Country\\_pres/Turkey\\_CNPP\\_Meeting\\_Turkey\\_Presentation\\_10-13\\_May\\_2016.pdf](https://www.iaea.org/NuclearPower/Downloadable/Meetings/2016/2016-05-10-05-13-NPES/Country_pres/Turkey_CNPP_Meeting_Turkey_Presentation_10-13_May_2016.pdf)

<sup>80</sup> International Energy Agency, "Turkey," *Energy Policies of IEA Countries*, 2009, <https://www.iea.org/publications/freepublications/publication/turkey2009.pdf>



Turkey currently has two operable research reactors and plans to build multiple nuclear power plants.<sup>81,82</sup> Although the first power plant at Akkuyu will be foreign built – and operated by Russia – Turkey is planning to decrease the involvement of foreign companies such as Rosatom over a series of three to four power plants and eventually build reactors that are “100 percent national.”<sup>83</sup> Four VVER units of 1200 megawatts electric (MWe) each will be Russian-built at Akkuyu with construction slated to begin in 2018.<sup>84</sup> A second nuclear power plant at the Sinop site, located at the Black Sea, was contracted to Mitsubishi Heavy Industries and AREVA in 2013.<sup>85</sup> The plant will be jointly owned and operated by Mitsubishi, Itochu, GDF SUEZ, AREVA, and EÜAŞ — the largest electric power company in Turkey, and will have a total capacity of 4400 MWe.<sup>86,87</sup> The construction of the ATMEA1 reactor, a French (AREVA) designed generation III+ pressurized water reactor, is to start in 2017, and the reactor is planned to start operating in 2023.<sup>88</sup> Another project at Igneada is in the planning stages with China. It will be constructed by China’s State Nuclear Nuclear Power and Technology Corporation (SNPTC) and Westinghouse, but operated by Turkey’s Elektrik Uretim. The planned reactors are two 1250 MWe AP1000s and two 1400MWe CAO1400s reactors.<sup>89</sup> Often, nuclear newcomers seek agreements with China or Russia to benefit from transfer of technology and knowledge going beyond the construction of a nuclear reactor. In this case too, the agreement “promises capacity improvement throughout the entire cycle of nuclear energy generation,” including “development of innovative reactor- and fuel-related technologies.”<sup>90</sup> According to an

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<sup>81</sup> IAEA Research Reactor Database, accessed July 2017, <https://nucleus.iaea.org/RRDB/RR/HeaderInfo.aspx?RId=342>

<sup>82</sup> David O’Byrne, “Turkey Aiming for Five Nuclear Power Plants by 2030: Ministry,” *Platts*, February 2, 2011, <http://www.platts.com/latest-news/electric-power/istanbul/turkey-aiming-for-five-nuclear-power-plants-by-8488525>

<sup>83</sup> “Davutoğlu says third nuclear plant will be ‘100 percent national’,” *Today’s Zaman*, October 21, 2014, [http://www.todayszaman.com/anasayfa\\_davutoglu-says-third-nuclear-plant-will-be-100-percent-national\\_362284.html](http://www.todayszaman.com/anasayfa_davutoglu-says-third-nuclear-plant-will-be-100-percent-national_362284.html). The article has been removed by Turkish authorities since, but the event was also covered by Nuclear Street News Team, “Turkey Plans on a 100 Percent Domestic Nuclear Plant,” *Nuclear Street*, October 23, 2014.

<sup>84</sup> Akkuyu NGS AS, “Akkuyu Nuclear Power Plant – Progress To-date and the Way Forward,” *PowerPoint Presentation at IAEA meeting*, IAEA, 2013, <https://www.iaea.org/NuclearPower/Downloadable/Meetings/2013/2013-02-11-02-14-TM-INIG/20.smirnov.pdf>

<sup>85</sup> Huseyin Erdogan, “Sinop nuke project’s site review to be ready by end ‘17,” *Anadolu Agency*, March 24, 2017. <http://aa.com.tr/en/economy/sinop-nuke-projects-site-review-to-be-ready-by-end-17-/778770>

<sup>86</sup> “Turkish utility eyes large stake in Sinop project,” *World Nuclear News*, May 12, 2015, <http://www.world-nuclear-news.org/C-Turkish-utility-eyes-large-stake-in-Sinop-project-12051501.html>

<sup>87</sup> Karel Beckman, “Interview Taner Yildiz, Energy Minister Turkey: ‘We will ensure security of supply through the market’,” *Energy Post*, August 24, 2015, <http://www.energypost.eu/taner-yildiz-energy-minister-turkey-competitive-market-can-ensure-security-supply/>

<sup>88</sup> Yasuro Kawai, “A business analysis of Japan’s NPP export to Turkey” (Tokyo: Citizens’ Nuclear Information Center, July 30, 2014), [http://www.cnici.jp/english/newsletter/nit161/nit161articles/01\\_export.html](http://www.cnici.jp/english/newsletter/nit161/nit161articles/01_export.html)

<sup>89</sup> “Nuclear Power in Turkey,” *World Nuclear Association*, updated June 21, 2017, <http://www.world-nuclear.org/information-library/country-profiles/countries-t-z/turkey.aspx>

<sup>90</sup> Altay Atli, “China, Turkey seal nuclear partnership,” *Asia Times*, August 31, 2016, <http://www.atimes.com/article/china-turkey-seal-nuclear-partnership/>

announcement made by Prime Minister Davutoğlu in October 2014, this third plant is the one that will be “100 percent national.”<sup>91</sup>

Turkey has one operating research reactor, one research reactor that is temporarily shut down, and one that is permanently shut down.<sup>92</sup> The operating research reactor, the Istanbul Technical University TRIGA Research Reactor (ITU-TRR) is a 250-kilowatt Triga Mark II reactor which started operating in March 1979.<sup>93</sup> Its main purposes are neutron radiography, neutron activation analysis, and teaching and training, and it only runs 12 weeks per year and two days per week.<sup>94</sup> Its fuel rods are composed of near 20 percent uranium 235.<sup>95</sup> The enriched uranium in the fuel, in the form of uranium-zirconium hydride, is enriched in the United States.<sup>96</sup> The second research reactor is at Cekmece Nuclear Research Training Center (CNRTC). The five-megawatt reactor, Turkish Reactor 2 or TR-2, started operating in December 1981 and was shut down in 1995.<sup>97,98</sup> Its main purpose was the production of medical and industrial isotopes including Tc-99<sup>99</sup> and Ir-192.<sup>100</sup> Originally operating on highly enriched uranium, it was gradually converted to operate on less than 20 percent enriched uranium.<sup>101</sup> All spent fuel of U.S. origin was removed from the country, with the last shipment of 5.4 kilograms (kg) highly enriched uranium (HEU) sent out in January 2010.<sup>102</sup> To restart the reactor, Turkey heavily invested in upgrading and overhauling it, and it is currently waiting for licensing.<sup>103</sup>

Another Turkish research and training center, Sarayköy Nuclear Research and Training Center (SANAEM), focuses on archaeological and geological use of nuclear material and

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<sup>91</sup> “Davutoğlu says third nuclear plant will be ‘100 percent national.’”

<sup>92</sup> *IAEA Research Reactor Database*.

<sup>93</sup> N. Aybers et al, “Planning and Implementation of Istanbul Technical University TRIGA Research Reactor Program,” IAEA Collection, 1982, [http://www.iaea.org/inis/collection/NCLCollectionStore/\\_Public/40/026/40026092.pdf](http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/40/026/40026092.pdf)

<sup>94</sup> “ITU-TRR,” *IAEA Research Reactor Database*, <https://nucleus.iaea.org/RRDB/RR/ExpmtlFacility.aspx?RId=343>

<sup>95</sup> T. Bueke and H. Yavuz, “Fuel Element Burn-Up Calculation in ITU TRIGA Mark-II Reactor,” IAEA Collection, September 1992, [http://www.iaea.org/inis/collection/NCLCollectionStore/\\_Public/40/010/40010582.pdf](http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/40/010/40010582.pdf)

<sup>96</sup> Ebinger et al, “Models for Aspirant Civil Nuclear Energy Nations in the Middle East” (Washington, DC: Brookings Institution, September 2011), [http://www.brookings.edu/~media/research/files/papers/2011/9/27-middle-east-nuclear-ebinger-banks/0927\\_middle\\_east\\_nuclear\\_ebinger\\_banks.pdf](http://www.brookings.edu/~media/research/files/papers/2011/9/27-middle-east-nuclear-ebinger-banks/0927_middle_east_nuclear_ebinger_banks.pdf)

<sup>97</sup> Turkish Atomic Energy Authority, “Turkey’s Regulatory Plans for High Enriched to Low Enriched Conversion of TR-2 Reactor Core,” IAEA Collection, [http://www.iaea.org/inis/collection/NCLCollectionStore/\\_Public/35/066/35066237.pdf](http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/35/066/35066237.pdf)

<sup>98</sup> “TR-2,” *IAEA Research Reactor Database*, <https://nucleus.iaea.org/RRDB/RR/HeaderInfo.aspx?RId=342>

<sup>99</sup> Technetium-99, a decay product of Mo-99, which is a fission product of U-235. For more information see: <http://hyperphysics.phy-astr.gsu.edu/hbase/nuclear/technetium.html>

<sup>100</sup> Turkish Atomic Energy Authority, “Research and Development, CNAEM,” updated October 4, 2010, <http://www.taek.gov.tr/en/research-development.html>

<sup>101</sup> “TR-2.”

<sup>102</sup> “Final HEU return from Turkey,” *World Nuclear News*, January 14, 2010, [http://www.world-nuclear-news.org/RS-Final\\_HEU\\_return\\_from\\_Turkey-1401108.html](http://www.world-nuclear-news.org/RS-Final_HEU_return_from_Turkey-1401108.html)

<sup>103</sup> “TR-2.”



techniques. The laboratory of the center's fission unit has three Am-Be neutron irradiation cells for research on nuclear properties of several elements, including uranium and thorium.<sup>104</sup> Additionally, a 30 mega-electron volt (MeV) cyclotron was constructed at the center in 2010 to produce radioisotopes and for research activities.<sup>105</sup> While any neutron source can in theory be used to irradiate uranium-238 to produce plutonium-239, non-reactor technologies are highly inefficient. According to an American Association for the Advancement of Science estimate, a 30 MeV neutron source would need 1,500-3,000 years to produce 5-10 kg Pu-239, the critical mass for a nuclear weapon.<sup>106</sup>

As of 2017, Turkey is far away from having the workforce or the technology needed to follow a nuclear Iran "immediately." In an interview with the IAEA, Necati Yamac, head of the Nuclear Energy Project and Implementing Department of the Turkish Ministry of Energy and Natural Resources, explained the benefits of the Build-Own-Operate (BOO) model intended for Turkey's first foreign-operated nuclear power plants: it saves time and resources.<sup>107</sup> A nuclear newcomer country like Turkey does not have the time or money to develop on its own the workforce and the experience needed for the "design, construction and operation of NPPs [nuclear power plants]."<sup>108</sup> In order to include Turkish citizens in the Akkuyu project, around 600 students are, or will be, studying science and engineering at the MePhi University in Russia.<sup>109</sup> For comparison, the *Turkish Nuclear Engineers Society, a non-profit organization for nuclear engineers, had 180 members in 2015, while their French partner, the French Nuclear Society had 3500.*<sup>110</sup> The workforce needed to operate a power plant would have to come from "a nuclear research group, which has to quickly learn the challenges of implementing a large industrial project."<sup>111</sup> The same time, expertise, and material constraints are true for nuclear weapon capabilities: laboratory scale enrichment of uranium will enhance the knowledge of a country's experts, but it does not result in industrial scale capability.

From a proliferation viewpoint, nuclear power plants that are operated by domestically-owned companies are more concerning than foreign-operated plants. Therefore, there are different proliferation concerns for Turkey's different plans with Rosatom and Mitsubishi. Under its

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<sup>104</sup> Turkish Atomic Energy Authority, "Fission Unit," October 04, 2010, <http://www.taek.gov.tr/en/institutional/affiliates/saraykoy-nuclear-research-and-training-center/291-research-a-development-division/907-fission-unit.html>

<sup>105</sup> Organisation for Economic Co-operation and Development (OECD), "Nuclear Legislation in OECD and NEA Countries," 2008, <https://www.oecd-neo.org/law/legislation/turkey.pdf>

<sup>106</sup> Seth A. Hoedl and Derek Updegraff, "Medical Isotopes without Reactors or Uranium Enrichment," American Association for the Advancement of Science, *PONI Summer Conference*, 2013

<sup>107</sup> Marta Ferrari, "How They Do It: Turkey," IAEA, February 11, 2014, <https://www.iaea.org/newscenter/news/how-they-do-it-turkey>

<sup>108</sup> Ferrari, "How They Do It: Turkey."

<sup>109</sup> Salih Sari, "Current Status of Nuclear Power Program in Turkey," *PowerPoint Presentation at 'Technical Meeting on Country Nuclear Power Profile'*, IAEA, Vienna, May 10-13, 2016, [https://www.iaea.org/NuclearPower/Downloadable/Meetings/2016/2016-05-10-05-13-NPES/Country\\_pres/Turkey\\_CNPP\\_Meeting\\_Turkey\\_Presentation\\_10-13\\_May\\_2016.pdf](https://www.iaea.org/NuclearPower/Downloadable/Meetings/2016/2016-05-10-05-13-NPES/Country_pres/Turkey_CNPP_Meeting_Turkey_Presentation_10-13_May_2016.pdf)

<sup>110</sup> "The French Nuclear Society signs a cooperation agreement with the Turkish Nuclear Engineers Society," French Nuclear Society Press Release, January 19, 2015, <https://www.euronuclear.org/e-news/e-news-47/sfen.htm>

<sup>111</sup> Ferrari, "How They Do It: Turkey."

agreement with Russia, Turkey will not have access to fuel or spent fuel from the power plant. Fuel will be imported from Russia and spent fuel exported right away.<sup>112</sup> This reduces the risk of Turkey further enriching the fuel or separating plutonium from spent fuel. The cooperation with Japan for the second nuclear power plant was accompanied by a Nuclear Energy Agreement between the two governments.<sup>113</sup> After a draft of the \$22 billion agreement was signed in May 2013 by Erdogan and his Japanese counterpart Prime Minister Shinzo Abe,<sup>114</sup> and revised to accelerate the project in January 2014, it caused controversy among Japanese and U.S. proliferation analysts. Some argued that it “contain[ed] a provision that would enable Turkey to eventually enrich uranium and extract plutonium by reprocessing spent nuclear fuel.”<sup>115</sup> The agreement was seen by many as a “respon[se] to Iran’s enrichment program.”<sup>116</sup> The agreement was subsequently modified and endorsed by the Diet, the Japanese legislative assembly, and entered into effect in June 2014.<sup>117</sup> The current agreement does not allow for a transfer of technologies for uranium enrichment or reprocessing of spent nuclear fuel to Turkey. However, Article VIII of the agreement states that this provision can be altered in the future if both governments agree. Details on the treatment of spent fuel are unknown. Japan has an excess of spent nuclear fuel and is unlikely to agree to the return of spent fuel.<sup>118</sup>

The nuclear power plant agreement with Japan and impending plans for a third, wholly national project with China signal that Turkey is planning to gradually reduce foreign guidance and control of its nuclear fuel cycle.

Turkey has no official plans to construct an enrichment or reprocessing facility but it has assiduously defended its right to acquire such facilities in the future: Turkey interprets Article IV of the NPT as granting the “right to enrich,” and has actively opposed further NSG restrictions on the transfer of enrichment and reprocessing technology. Turkey became member of the NSG in 2000, shortly after joining the Zangger Committee in 1999.<sup>119</sup> Acquiring these steps would be attractive from the point of nuclear energy independence, or ‘closing’ the domestic nuclear fuel cycle, but it would also bring Turkey significantly closer to nuclear weapons.

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<sup>112</sup> Sinan Uelgen, “Turkey and the Bomb” (Washington, D.C.: Carnegie Endowment for International Peace, February 2012), [http://carnegieendowment.org/files/turkey\\_bomb.pdf](http://carnegieendowment.org/files/turkey_bomb.pdf)

<sup>113</sup> Ministry of Foreign Affairs of Japan, “Agreement between the Government of Japan and the Government of the Republic of Turkey for Co-operation in the use of Nuclear Energy for peaceful purposes,” Approved by Japanese Diet on April 18, 2014, <http://www.mofa.go.jp/mofaj/files/000018111.pdf>

<sup>114</sup> Selcan Hacaoglu and Tara Patel, “Mitsubishi, Areva Sign \$22b Turkish Nuclear Plant Deal,” *Bloomberg*, May 03, 2013, <http://www.bloomberg.com/news/articles/2013-05-03/mitsubishi-areva-set-to-sign-turkish-nuclear-plant-deal-today>

<sup>115</sup> EDITORIAL: Urgent rethink needed on Japan-Turkey nuclear energy pact,” *The Asahi Shimbun*, January 8, 2014, <http://ajw.asahi.com/article/views/editorial/AJ201401080039>

<sup>116</sup> Jessica C. Varnum, “Closing the Nuclear Trapdoor in the U.S.-Turkey ‘Model’ Partnership” (Washington, D.C.: The Brookings Institution, Turkey Project Policy Paper, No. 1, June 2013), <http://www.brookings.edu/~media/research/files/papers/2013/06/17-us-turkey-nuclear-partnership-cooperation-varnum/17-us-turkey-nuclear-partnership-cooperation-varnum.pdf>

<sup>117</sup> Kawai, “A business analysis of Japan’s NPP export to Turkey.”

<sup>118</sup> Kawai, “A business analysis of Japan’s NPP export to Turkey.”

<sup>119</sup> Organisation for Economic Co-operation and Development (OECD), “Nuclear Legislation in OECD and NEA Countries,” 2008, <https://www.oecd-neo.org/law/legislation/turkey.pdf>

Enrichment ambitions were dismissed publicly by Energy Minister Taney Yildiz.<sup>120</sup> Yildiz stated in October 2013 that enriched uranium will remain imported, and in 2014, he reconfirmed: “Turkey does not have an aim of building an atom bomb, nor nuclear enrichment.”<sup>121</sup> At both the 2009 and 2010 meetings of the NSG, however, Turkey objected to “further restrictions on access to nuclear material, equipment, and technology beyond restrictions expressed in the NPT.”<sup>122</sup> More specifically, Turkey was concerned that its own nuclear infrastructure would be disadvantaged because the proposed guidelines asked suppliers to consider “[g]eneral conditions of stability and security” within the recipient’s state and the state’s region before agreeing to the transfer of any material.<sup>123</sup> Turkey also opposed the “black-box” approach, proposed by the United States, which asks suppliers to ensure that the transfer “take[s] place under conditions that will not permit or enable the replication of the technology.”<sup>124</sup> In 2012, the NSG reached an agreement on the revision of the guidelines, and the 2013 version of the NSG guidelines contained both ideas Turkey had opposed, but in looser language.

Turkey has invested in a fuel rod production facility and uranium mining, crucial steps toward making domestically produced nuclear fuel. A 2015 research center report cites Turkish newspapers reporting Turkey’s hopes to construct a fuel rod production facility.<sup>125</sup> The report mentions a \$300 million investment planned for the production facility.<sup>126</sup> According to Yildiz, Turkey plans on producing the “outer shell”<sup>127</sup> of nuclear fuel pellets; enriched uranium will be imported. Yildiz does not name a potential supplier, but refers to the “seven countries that enrich uranium” as possible suppliers. The plan to import raw enriched uranium, not in the form of fuel pellets, is in accord with Turkey’s refusal to agree to the 2008 version of the NSG’s proposed stricter guidelines on enrichment (and reprocessing).

Turkey does not have an enrichment facility; all enriched fuel has been imported. However, in 2009, the Mineral Research & Exploration General Directorate (MTA) laboratory began to

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<sup>120</sup> “Energy in 2011,” Anadolu Agency, *AA Energy News Terminal*.

<sup>121</sup> Ersan Temizel, “Nuclear power plant fuel rods to be produced in Turkey,” Enerji Enstitüsü, October 28, 2013. Translated by Google Translate, original title: “Nükleer santralin yakıt çubukları Türkiye’de üretilcek,” <http://enerjiensitusu.com/2013/10/28/nukleer-santralin-yakit-cubuklari-turkiyede-uretilecek/>; “Turkey’s nuclear plant for peaceful purposes: Yildiz,” Anadolu Agency, October 10, 2014, <http://aa.com.tr/en/economy/turkeys-nuclear-plant-for-peaceful-purposes-yildiz/112298>

<sup>122</sup> Mark Hibbs, “Nuclear Suppliers Group and the IAEA Additional Protocol” (Washington, D.C.: Carnegie Endowment for International Peace, August 18, 2010), <http://carnegieendowment.org/2010/08/18/nuclear-suppliers-group-and-iaea-additional-protocol>

<sup>123</sup> Daniel Horner, “NSG Revises Rules on Sensitive Exports,” *Arms Control Today*, August 2011, <http://search.proquest.com.ezproxy.vccs.edu:2048/docview/884218279/2ADC40EC266E4043PQ/1?accountid=12902>

<sup>124</sup> Fred McGoldrick, “Limiting Transfers of Enrichment and Reprocessing Technology: Issues, Constraints, Options” (Cambridge: Harvard University Belfer Center, Project on Managing the Atom, May 2011), <http://belfercenter.ksg.harvard.edu/files/MTA-NSG-report-color.pdf>

<sup>125</sup> Ahmet K. Han et al., “Nuclear Security: A Turkish Perspective,” *EDAM Center for Economics and Foreign Policy Studies*, Istanbul, 2015, [http://edam.org.tr/document/NuclearBook3/edam\\_nucphysec2015\\_full.pdf](http://edam.org.tr/document/NuclearBook3/edam_nucphysec2015_full.pdf)

<sup>126</sup> Ersan Temizel, “Nuclear power plant fuel rods to be produced in Turkey.”

<sup>127</sup> Ersan Temizel, “Nuclear power plant fuel rods to be produced in Turkey.”

produce small quantities of uranium hexafluoride, the uranium compound used for enrichment in gas centrifuges.<sup>128</sup> Laboratory reports and publications indicate small scale usage of uranium hexafluoride and other uranium fluoride compounds at the Technical University in Istanbul<sup>129</sup> and other institutions. Also in small quantities, the MTA converts natural uranium to uranium oxide, and since 1986 it has been producing UO<sub>2</sub> pellets that can be used for a nuclear reactor.<sup>130</sup> An active IAEA project, approved in 2012, is titled “Supporting Uranium Exploration, Resource Augmentation and Production Using Advanced Techniques.”<sup>131</sup>

Turkey has abundant natural uranium and thorium deposits. After decades of researching and evaluating different sites, Turkey started its first mining and purification project, the Temrezli project, in 2011.<sup>132</sup> An annual 385 tonnes of uranium are planned to be produced, however, a drop in uranium market prices has stalled the effort temporarily.<sup>133</sup>

There are units within CNRTC’s Nuclear Technology Division of interest from a proliferation standpoint: within nuclear physics, radioisotope, reactor technology, and material technology units, studies are conducted on power plant and research reactor design and technology, fuel and material, fuel production techniques, and safety. Specific activities include purifying small quantities of uranium,<sup>134</sup> analyzing “every type of nuclear material” and neutron activation, and manufacturing UO<sub>2</sub>, ThO<sub>2</sub> and ThUO<sub>2</sub> powder and pellets.<sup>135</sup>

While developing its nuclear infrastructure, Turkey is also investing in a domestic ballistic missile system, which adds weight to the international community’s task to ensure Turkey’s nuclear program remains strictly civilian.<sup>136</sup> Turkey already has nuclear-capable aircraft, such as

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<sup>128</sup> Uelgen, “Turkey and the Bomb.”

<sup>129</sup> Ziya Engin Erkmen, “A study on the reaction of yttria (Y<sub>2</sub>O<sub>3</sub>) in flowing uranium hexafluoride (UF<sub>6</sub>) gas at 900°C,” *Journal of Nuclear Materials*, October 1998, [https://www.researchgate.net/publication/232370696\\_A\\_study\\_on\\_the\\_reaction\\_of\\_yttria\\_%28Y2O3%29\\_in\\_flow\\_wing\\_uranium\\_hexafluoride\\_%28UF6%29\\_gas\\_at\\_900C](https://www.researchgate.net/publication/232370696_A_study_on_the_reaction_of_yttria_%28Y2O3%29_in_flow_wing_uranium_hexafluoride_%28UF6%29_gas_at_900C)

<sup>130</sup> Uelgen, “Turkey and the Bomb.”

<sup>131</sup> Nuclear Energy Agency and the International Atomic Energy Agency, “Uranium 2016: Resources, Production and Demand,” OECD, 2016, <https://www.iaea.org/technicalcooperation/documents/Projects/TCEU/Turkey.pdf>

<sup>132</sup> Philipp M. Mobbs, “The Mineral Industry of Turkey,” in U.S. Department of the Interior and U.S. Geological Survey, *2011 Minerals Yearbook*, 2011, <http://minerals.usgs.gov/minerals/pubs/country/2011/myb3-2011-tu.pdf>

<sup>133</sup> IAEA Report by the General Director, “Nuclear Technology Review 2014,” July 17, 2014, [https://www.iaea.org/About/Policy/GC/GC58/GC58InfDocuments/English/gc58inf-4\\_en.pdf](https://www.iaea.org/About/Policy/GC/GC58/GC58InfDocuments/English/gc58inf-4_en.pdf)

IAEA Report by the General Director, “Nuclear Technology Review 2015,” July 2, 2015, [https://www.iaea.org/About/Policy/GC/GC59/GC59InfDocuments/English/gc59inf-2\\_en.pdf](https://www.iaea.org/About/Policy/GC/GC59/GC59InfDocuments/English/gc59inf-2_en.pdf)

<sup>134</sup> Uelgen, “Turkey and the Bomb.”

<sup>135</sup> Can S., “Activities and Cooperation Opportunities at CEKMECE Nuclear Research and Training Center,” published in *The Third Eurasian Conference ‘Nuclear Science and its Application’*, IAEA, October 2004 [http://www.iaea.org/inis/collection/NCLCollectionStore/\\_Public/36/108/36108804.pdf](http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/36/108/36108804.pdf)

<sup>136</sup> “Turkey test-fires first domestically-manufactured ballistic missile,” *PressTV*, May 12, 2017, <http://www.presstv.ir/Detail/2017/05/12/521559/Turkey-ballistic-missile-NATO-Russia>

Turkish McDonnell-Douglas F-4 aircraft, which are capable of delivering tactical B61 nuclear weapons (B61-3 and B61-4).<sup>137,138</sup>

## Research and Training

In addition to its physical infrastructure, Turkey must also invest in its academic sector in order to have a burgeoning nuclear power program; currently there are only a few nuclear engineering and related programs. Ankara University has a “subcritical assembly” where students learn about reactor mechanisms using light water and natural uranium.<sup>139</sup> The core consists of 2,500 kilograms of natural uranium that was supplied by the United States.<sup>140</sup> Extensive exchange programs with Russia and Japan are taking place to increase the number of engineering students. Additionally, the second nuclear power plant at Sinop will incorporate a nuclear training center for simulators, laboratories, and workshops.<sup>141</sup> Although Turkey’s nuclear energy workforce currently lacks the quantity of personnel needed, it has been developing good quality personnel in other scientific and engineering fields. In May 2014, Turkey’s European Council for Nuclear Research (CERN) membership was upgraded from observer status to associate member, which means that Turkish physicists can actively participate in “high energy” physics experiments, although it should be noted that these activities have nothing to do with sensitive nuclear facilities or nuclear weapons.<sup>142</sup> However, they show that if Turkey invests the resources, it will develop a more sophisticated scientific and technical workforce.

A review of both older and recent scientific journals, reports, and dissertations, indicates that sophisticated research is being done in the field of nuclear engineering. Noticeable from a proliferation standpoint are topics such as: uranium-fluoride compounds, both liquid and

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<sup>137</sup> “The B61 Life Extension Program” (Washington, D.C.: Union of Concerned Scientists, accessed July 26, 2017), <http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nwgs/B61-life-extension-program-FS.pdf>

<sup>138</sup> Peter Davies, “USAF McDonnell Douglas F-4 Phantom II,” (Bloomsbury Publishing, 2013), p. 28.

<sup>139</sup> F. Domanic, “Atomic Energy Projects Turkey,” published in M.L. Smith, *The Role of Science in the Development of Natural Resources with Particular Reference to Pakistan, Iran and Turkey* (Great Britain: Pergamon Press, January 1962), [https://books.google.com/books?id=g-xsBQAAQBAJ&pg=PA138&lpg=PA138&dq=ankara+university+subcritical+assembly&source=bl&ots=D2P3ewKNfE&sig=o7erShU3DHmm\\_2OhR-w8q4SM0G4&hl=en&sa=X&ved=0ahUKEwif\\_tO-xPLJAhUKSyYKHeg1AmQQ6AEIKzAC#v=onepage&q=ankara%20university%20subcritical%20assembly&f=false](https://books.google.com/books?id=g-xsBQAAQBAJ&pg=PA138&lpg=PA138&dq=ankara+university+subcritical+assembly&source=bl&ots=D2P3ewKNfE&sig=o7erShU3DHmm_2OhR-w8q4SM0G4&hl=en&sa=X&ved=0ahUKEwif_tO-xPLJAhUKSyYKHeg1AmQQ6AEIKzAC#v=onepage&q=ankara%20university%20subcritical%20assembly&f=false)

<sup>140</sup> *Nuclear Engineering International*, Volume 6 (California: Heywood-Temple Industrial Publications, 2011) <https://books.google.com/books?id=Eh5KAQAIAAJ&q=uranium-zirconium+hydride+turkey&dq=uranium-zirconium+hydride+turkey&hl=en&sa=X&ved=0ahUKEwi8vtK5wfLJAhVMeT4KHZ8rBZUQ6AEISjAG>

<sup>141</sup> Sari, “Current Status of Nuclear Power Program in Turkey.”

<sup>142</sup> Dan Noyes, “Turkey to become Associate Member State of CERN,” CERN, May 12, 2014, <http://home.cern/about/updates/2014/05/turkey-become-associate-member-state-cern>

gaseous;<sup>143</sup> heavy water reactor nuclear fuel pellets consisting of UO<sub>2</sub> and ThO<sub>2</sub>;<sup>144</sup> pressurized light-water-reactors (LWR) fueled with plutonium, urania-gadolinia, and low enriched uranium (LEU)-thorium;<sup>145</sup> accelerator-driven systems (ADS) fueled with thorium;<sup>146</sup> light water reactor (LWR) spent fuel;<sup>147</sup> and fusion and hybrid reactors.<sup>148</sup>

Research on different reactor types and fuels is common. It serves as a way for scientists and engineers to become more familiar with nuclear properties, reactions and processes, independent of whether this knowledge will be used for peaceful or military purposes. Knowing how to store and handle uranium-fluoride compounds, especially in gaseous state, is one example. Uranium-fluoride compounds are important for the enrichment of uranium, which is needed for light-water reactor fuel, but can also be used to make highly enriched uranium for a nuclear explosive.

### Export Controls, Safeguards, and Proliferation Obstacles

Although Turkey is a member of the NSG, it poorly enforces its own export control laws. There have been numerous cases of controlled or otherwise sensitive nuclear-related goods passing through Turkey to Iran. On the Institute's Peddling Peril Index, which evaluates the effectiveness of countries' export control system, Turkey is in the bottom ranking. For many countries with poor export control records, they also are more willing to pursue illegal imports for their own purposes. As such, concerns remain that if Turkey pursues sensitive nuclear capabilities, it may seek to procure goods illicitly if suppliers deny imports.

Because Turkey has ratified the Additional Protocol, the IAEA is familiar with Turkey's current nuclear capacity and plans: it also works closely with the Turkish Atomic Energy Authority (Türkiye Atom Enerjisi Kurumu) or TAEK to ensure that all safety and security measures are applied. Since 2012, the IAEA has awarded Turkey annually with the "broader conclusion"

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<sup>143</sup> Z. E. Erkmen, S. Anghaie, "Performance of molybdenum with UF<sub>4</sub> at high temperatures as a wall material for space reactors," 1997, <http://link.springer.com/article/10.1007/s11661-997-0169-4>; Z.E. Erkmen, "A study on the corrosion behavior of yttria (Y<sub>2</sub>O<sub>3</sub>) in flowing uranium hexafluoride (Uf<sub>6</sub>) gas at 1173 K," *Korozyon*, 1993.

<sup>144</sup> S. Can, "Recent activities of the nuclear fuel technology department of Cekmece Nuclear Research and Training Center," Accessed January 2016,

[http://www.iaea.org/inis/collection/NCLCollectionStore/\\_Public/31/006/31006085.pdf](http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/31/006/31006085.pdf)

<sup>145</sup> H. Disbudak, "Perspective of thorium research and boron carbide coating of urania-gadolinia fuel in Turkey," in IAEA-TECDOC-1319, 2002.

<sup>146</sup> M. Arik et al, "A provisional study of ADS within Turkic Accelerator Complex Project," in *Thorium Energy for the World* (Switzerland: Springer, Cham, 2016), pp. 423-424.

<sup>147</sup> S. Sahin, H. Yapici, "Rejuvenation of light water reactor spent fuel in fusion blankets," *Annals of Nuclear Energy*, November 1998, Vol. 25, Issue 16, pp. 1317-1330,

<http://www.sciencedirect.com/science/article/pii/S0306454998000188>; S. Sahin, B. Sarer, Y. Celik, "Utilization of nuclear waste plutonium and thorium mixed fuel in candu reactors," *International Journal of Energy Research*, November 2016, Vol. 40, Issue 14, pp. 1901-1907,

<http://onlinelibrary.wiley.com/doi/10.1002/er.3464/abstract>

<sup>148</sup> Kadir Yildiz and Adem Acir, "Investigation of Effectiveness of different Tritium breeding materials in a fusion-fission hybrid reactor fueled with ThSi<sub>2</sub> – moderated with natural Li," *Journal of the Faculty of Engineering and Architecture of Gazi University*, 2005, Vol. 20, Issue 4, p. 463.



under the Additional Protocol and Comprehensive Safeguards Agreement.<sup>149</sup> This safeguards conclusion, still absent in the case of Iran, by contrast, means that “all of the nuclear material in the State had been placed under safeguards and remained in peaceful nuclear activities [...]”, and, more relevant for Turkey, concludes “the absence of undeclared nuclear material and activities.”<sup>150</sup>

Turkey has been participating in numerous IAEA Technical Cooperation (TC) Programmes<sup>151</sup> and has signed a Country Programme Framework for 2013-2017.<sup>152</sup> In November 2013, the IAEA conducted an Integrated Nuclear Infrastructure Review (INIR) mission in Turkey. The mission goes over the ‘19 Milestones in the Development of a National Infrastructure for Nuclear Power’ and evaluates a possible nuclear infrastructure through site visits, interviews and reviewing of documents.<sup>153,154</sup> Unfortunately, unlike the UAE and Jordan, Turkey has not agreed to make its INIR report publicly available. The IAEA’s detailed understanding of Turkey’s nuclear situation may make any steps taken by Turkey towards nuclear weapons capabilities more evident, suspicious, and detectable.

These extensive cooperation programs, especially on the technical side, indicate that if Turkey should decide to “close” the domestic fuel cycle and start an enrichment or reprocessing program, it would likely initially try to acquire the needed technology under safeguards. However, given the actions of Erdogan, the country’s political turmoil, and on-going tensions in the region, suppliers in the NSG would likely block the sale of enrichment or reprocessing plants to Turkey, even under safeguards. However, Turkey could pursue a slower path of domestically building sensitive nuclear facilities via the illicit procurement of technology, equipment, and materials abroad. The plant would be expected to be placed under safeguards, but today illicit procurements for safeguarded plants are not prohibited by existing treaties and safeguards agreements and cannot be excluded in the case of Turkey. If Turkey builds enrichment or reprocessing plants under safeguards, it could decide to use them later to break out to nuclear weapons or as a basis to build covert, parallel, sensitive facilities, although the latter approach risks detection and a negative international response, long before Turkey could finish any facilities. In the former case, the facilities would be available in case Turkey decides to promptly and openly pursue nuclear weapons after withdrawing from the Nuclear Non-Proliferation Treaty. Although this step would be momentous, it will become more likely if Iran pursues nuclear weapons.

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<sup>149</sup> IAEA, “IAEA SAFEGUARDS GLOSSARY Edition 2001,” INTERNATIONAL NUCLEAR VERIFICATION SERIES No. 3, Vienna, 2002, [http://www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3\\_scr.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/nvs-3-cd/PDF/NVS3_scr.pdf)

<sup>150</sup> Ibid.

<sup>151</sup> Varnum, “Closing the Nuclear Trapdoor in the U.S.-Turkey ‘Model’ Partnership.”

<sup>152</sup> IAEA Department of Technical Cooperation, “Turkey signs a Country Programme Framework (CPF) for 2013-2017,” September 17, 2013, [https://www.iaea.org/technicalcooperation/Regions/Europe/News/Archive/09172013\\_CPF\\_Turkey.html](https://www.iaea.org/technicalcooperation/Regions/Europe/News/Archive/09172013_CPF_Turkey.html)

<sup>153</sup> Starz and Dyck, “IAEA Reviews Turkey's Progress in Nuclear Power Development,” IAEA, November 14, 2013, <https://www.iaea.org/newscenter/news/iaea-reviews-turkeys-progress-nuclear-power-development>

<sup>154</sup> IAEA, “Integrated Nuclear Infrastructure Review Missions,” Updated November 11, 2015, <https://www.iaea.org/NuclearPower/Infrastructure/INIR.html>

If Turkey were to pursue developing the means to build nuclear weapons themselves, separate from making nuclear explosive materials, it would need to circumvent safeguards and international attention. In that case, it would need to pursue this capability via illicit trade networks and covert domestic activities.

While Turkey is not actively pursuing enrichment or reprocessing capabilities as of 2017, it is actively pushing to keep the door to acquiring sensitive nuclear capabilities, as the international community is trying to close it further. Turkey's main reasoning for defending Iran's "right to enrich" is that it does not want to rule out the option to go as far as Iran.

## **Conclusion**

A U.S. priority should be discouraging and blocking Turkey developing sensitive fuel cycle capabilities. This policy should be carried out at the NSG and in bilateral discussions with potential suppliers, and with Turkey directly.

Turkey should be encouraged to improve the effectiveness of its export control systems, particularly as they affect exports or retransfers to Iran. Toward this end, the United States should produce an evaluation of how Iran and other pariah states exploit Turkey's weak export control system. An unclassified version of this study should be presented to Turkey, and in egregious cases, prosecutions sought. If Turkey is uncooperative, the United States should impose sanctions on the companies and entities committing illicit exports.

Western national intelligence capabilities should focus on the detection of proliferation-relevant Turkish research and development, as well as procurements which could signify covert, or even overt, nuclear fuel cycle development or interest in nuclear weaponization.

To reduce further Turkey's incentives to seek nuclear weapons capabilities, the United States should continue to seek a strong defense relationship with Turkey, including maintaining Turkey as a productive member of NATO. However, the United States should make clear to Turkey in private conversations that its pursuit of uranium enrichment or reprocessing would threaten the U.S. defense commitment to it and destroy it if Turkey seeks nuclear weapons. This U.S. policy should happen in parallel with efforts to strengthen and extend, or make permanent, the nuclear limitations of the JCPOA.

## **Egypt**

### **Summary**

*Egypt may develop an indigenous nuclear weapons capability in response to Iran's nuclear accomplishments. It has the one of the largest nuclear infrastructures in the Middle East, has sought nuclear weapons in the past, and views Iran as a regional rival. Its main regional rival in the nuclear realm is Israel, and Egypt considered developing nuclear weapons in the 1960s and early 1970s to counter it, but abandoned those efforts long ago. However, if Iran's nuclear*



*program appears threatening or advanced nuclear capabilities begin to proliferate beyond Iran in the Middle East, Egypt may seek parity. Much like Turkey, it seeks to maintain an option to develop enrichment or reprocessing capabilities. Egypt is also a vocal nuclear disarmament advocate and supports a Middle East Zone Free of Nuclear Weapons, while eschewing stronger nonproliferation commitments. It is an NPT signatory but not a signatory to the Additional Protocol, and is adamant that the Nuclear Non-Proliferation Treaty (NPT) preserves a country's rights to all nuclear energy related technologies, including sensitive technologies such as uranium enrichment and reprocessing capabilities. The country had issues with the implementation of its IAEA safeguards agreement in 2004 and 2006 due to the revelation of undeclared nuclear material, activities, and facilities that spanned many years. A minor issue arose again in 2007 and 2008 relating to the discovery of uranium particles.*

*Egypt currently possesses one operating research reactor and limited nuclear infrastructure but has ambitious nuclear energy plans. The success of the latter may depend on improved political and economic stability of the country, which remains in tumult following a revolution in 2011 leading to the ouster of President Hosni Mubarak and election of Mohamed Morsy, a military coup in 2013, and election of former military chief Abdel Fattah el-Sisi in 2014. It is likely that domestic and economic turmoil will preoccupy Egypt's leaders for some time and that these matters will be placed on a higher agenda than ambitions for advanced nuclear capabilities, making its proliferation risk moderate for the time being. It should, however, be watched closely for signs that it is seeking advanced nuclear capabilities in preparation for a resurgent Iranian program. The United States should continue efforts to keep sensitive nuclear capabilities from being built in Egypt and it should increase pressure on it to ratify the Additional Protocol.*

## **Security Context**

Egypt pursued ballistic missile and nuclear weapons capabilities under President Gamel Abdel Nasser's regime in the 1960s, attempting to purchase nuclear weapons or technology from China, the Soviet Union, and Europe. However, these efforts were unsuccessful and ultimately abandoned. Egypt's loss in the 1967 war prevented further attempts.<sup>155</sup> Its forbearance has been an irritant to successive Egyptian governments and senior Egyptian officials have often stated to Institute personnel that while it abandoned its nuclear weapons ambitions to match Israel's nuclear weapons, it would be unlikely to continue to resist obtaining nuclear weapons if Iran obtained them.

Egypt has historically held tense relations with Iran and sides with the Arab bloc of Middle Eastern states. Nevertheless, various leaders have pursued warmer Iran relations. Egypt may seek advanced nuclear capabilities in response to either a perceived threat from a resurgent nuclear Iran and to achieve parity with Iran or other proliferant states in the Middle East in terms of regional power.

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<sup>155</sup> Robert J. Einhorn, "Egypt: Frustrated but Still on a Non-Nuclear Course," in *The Nuclear Tipping Point: Why States Reconsider their Nuclear Choices* (Washington, DC: Brookings Institution Press, 2004)

Egypt's relations with Iran were tense under President Nasser in the 1950s and 1960s, but ties were restored under President Anwar Sadat during the 1970s. However, after the Shah of Iran was overthrown in 1979, Egypt took him in, cutting off relations with Iran. The Shah was a friend of Egyptian President Anwar Sadat and lived out the remainder of his days in Cairo.<sup>156</sup> Relations remained hostile under President Hosni Mubarak, with Iran criticizing Egypt's peace treaty with Israel. Egypt supported Iraq during the Iran-Iraq War.<sup>157</sup> Following Mubarak's ouster in early 2011, the Muslim Brotherhood's Mohammed Morsy assumed a one-year term as president during which a brief thaw in relations occurred. The Iranian regime saw Morsy's less secular regime as a potential partner, despite adhering to different religious sects. Morsy traveled to Tehran in August 2012, marking the first visit by an Egyptian president in decades.<sup>158</sup> This signaled a divergence from the United States, since Egypt under Mubarak traditionally followed the U.S. lead on the Iran issue.

After Morsy was overthrown in a coup in the summer of 2013, current President Abdel Fatah al-Sisi came to power and his regime resumed cold relations with Iran. Egypt remains heavily reliant on Gulf benefactors like Saudi Arabia and the UAE, heavily influencing its Iran policy. Yet, it holds nuanced views. As one Egyptian diplomat expressed to *Ahram Online* in mid-2015, Egypt also seeks "to avoid going as far as being identical with the highly sceptical Saudi position."<sup>159</sup> The diplomat continued, "But of course we cannot turn our back on the direct and clear Saudi demand to show caution over the return of Iran."

### Current Plans and Capabilities

Egypt's nuclear infrastructure consists of two research reactors, a two megawatt-thermal (MWth) Russian ETRR-1 reactor and a 22-MWth Argentinian ETRR-2 reactor.<sup>160</sup> The former is temporarily shut down and no information on the expected restart date is available.<sup>161</sup> Egypt carries out limited activities relating to both the front-end and back-end of the reactor's fuel cycle. At the Fuel Manufacturing Pilot Plant, it produces and assembles fuel elements from

<sup>156</sup> Oren Kessler, "Egypt: Iran's Next Sunni Rival," *National Interest*, August 3, 2015,

<http://nationalinterest.org/feature/egypt-irans-next-sunni-enemy-13474>

<sup>157</sup> Mohamed Saied, "Egypt Sets Conditions for Dialogue with Iran," *Al-Monitor*, April 26, 2016, <http://www.al-monitor.com/pulse/en/originals/2016/04/egypt-conditions-dialogue-iran-sisi.html>

<sup>158</sup> Ernesto Londono, "Visit by Egypt's Morsi to Iran Reflects Foreign Policy Shift," *The Washington Post*, August 27, 2012, [https://www.washingtonpost.com/world/middle\\_east/visit-by-egypts-morsi-to-iran-reflects-foreign-policy-shift/2012/08/27/4baf4b3a-f060-11e1-b74c-84ed55e0300b\\_story.html](https://www.washingtonpost.com/world/middle_east/visit-by-egypts-morsi-to-iran-reflects-foreign-policy-shift/2012/08/27/4baf4b3a-f060-11e1-b74c-84ed55e0300b_story.html)

<sup>159</sup> Dina Ezzat, "Wait and see: Egypt's line on Iran," *Ahram Online*, August 1, 2015,

<http://english.ahram.org.eg/NewsContent/1/151/136683/Egypt/Features/Wait-and-see-Egypt-s-line-on-Iran.aspx>

<sup>160</sup> Eng. Nour Abouelhasan, "Overview of Egypt's Nuclear Power Program," *Power Point Presentation at the Technical Meeting on Topical Issues in the Development of Nuclear Power Infrastructure*, International Atomic Energy Agency, Vienna, January 31 - February 3, 2017, [https://www.iaea.org/NuclearPower/Downloadable/Meetings/2017/2017-01-31-02-03-NIDS/Session\\_1\\_-\\_Considerations\\_for\\_Nuclear\\_Energy\\_Programme\\_Implementing\\_Organizations\\_\(NEPIOs\)/Session\\_1\\_-\\_Considerations\\_for\\_Nuclear\\_Energy\\_Programme\\_Implementing\\_Organizations\\_\(NEPIOs\)/Overview\\_of\\_Egypt's\\_Nuclear\\_Power\\_Program\\_-\\_N.\\_Antar\\_-\\_Egypt.pdf](https://www.iaea.org/NuclearPower/Downloadable/Meetings/2017/2017-01-31-02-03-NIDS/Session_1_-_Considerations_for_Nuclear_Energy_Programme_Implementing_Organizations_(NEPIOs)/Session_1_-_Considerations_for_Nuclear_Energy_Programme_Implementing_Organizations_(NEPIOs)/Overview_of_Egypt's_Nuclear_Power_Program_-_N._Antar_-_Egypt.pdf)

<sup>161</sup> "ETRR-1," IAEA Research Reactor Database, <https://nucleus.iaea.org/RRDB/RR/HeaderInfo.aspx?RId=116>

imported, enriched uranium hexafluoride.<sup>162</sup> At the Hot Laboratory and Waste Management Center (HLWMC), Egypt hosts hot cells and conducts low level spent fuel management of both liquid and solid wastes.<sup>163</sup> There is no report of decommission of the ETRR-1, so the reactor site may still have fuel, both fresh or spent, however none of it is highly enriched uranium. The liquid and solid waste from the ETRR-1 reactor is most likely still at the storage facility at the Inshas site.<sup>164</sup>

Nuclear power plants have been planned by Egypt since the 1980s in order to meet a growing domestic energy demand, diversify the country's power sources, and reduce reliance on limited indigenous fossil fuel resources.<sup>165</sup> Most recently, in 2015, ROSATOM signed an agreement to build Egypt's first nuclear power plant at el-Dabaa. The plant will have four units with a power output of 1200 megawatts-electric (MWe) each.<sup>166</sup> They are due to be completed by 2022 and scheduled to begin operating in 2024.<sup>167</sup> Egypt aims to be involved in the fuel cycle of its power reactors. Abdel Aty Salman, former chairman of the Nuclear Materials Authority, runs a website in the Arabic language to promote increasing Egyptian knowledge of uranium and nuclear research. Salman expressed a desire for his country to sustain a "strong, 100% Egyptian nuclear reactor." The website indicates that research has been conducted on uranium deposits in Sinai, and the Eastern and Western Deserts in Egypt.<sup>168</sup> In addition to exploration and evaluation of uranium deposits, Egypt has invested in a uranium extraction plant.<sup>169</sup>

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<sup>162</sup> W. I. Zidan and I. M. Elseaidy, Atomic Energy Authority of Egypt, "General Description and Production Lines Of The Egyptian Fuel Manufacturing Pilot Plant," IAEA International Nuclear Information System, Uploaded December 2004, <http://www.iaea.org/inis/collection/NCLCollectionStore/Public/36/018/36018095.pdf>

<sup>163</sup> M.K.Shaat, Director of ETRR-2 Reactor, Atomic Energy Authority, "Report on, National Situation Report on, National Situation for Decommissioning Activities for Decommissioning Activities in Egypt in Egypt," *PowerPoint Presentation at R2D2P Meeting*, Sydney, Australia, November 12 - 16, 2007, <https://www-ns.iaea.org/downloads/rw/projects/r2d2/workshop3/national-presentations/egypt-national-decomissioning-activities.pdf>

<sup>164</sup> IAEA, "Management and Storage of Research Reactor Spent Nuclear Fuel," Proceedings of a Technical Meeting held in Thurso, United Kingdom, October 19 - 22, 2009, [http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1592\\_web.pdf](http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1592_web.pdf)

<sup>165</sup> Eng. Nour Abouelhassan, "Overview of Egypt's Nuclear Power Program," *Power Point Presentation at the Technical Meeting on Topical Issues in the Development of Nuclear Power Infrastructure*, International Atomic Energy Agency, Vienna, January 31 - February 3, 2017, [https://www.iaea.org/NuclearPower/Downloadable/Meetings/2017/2017-01-31-02-03-NIDS/Session\\_1\\_-\\_Considerations\\_for\\_Nuclear\\_Energy\\_Programme\\_Implementing\\_Organizations\\_\(NEPIOs\)/Session\\_1\\_-\\_Considerations\\_for\\_Nuclear\\_Energy\\_Programme\\_Implementing\\_Organizations\\_\(NEPIOs\)/Overview\\_of\\_Egypt's\\_Nuclear\\_Power\\_Program\\_-\\_N.\\_Antar\\_-\\_Egypt.pdf](https://www.iaea.org/NuclearPower/Downloadable/Meetings/2017/2017-01-31-02-03-NIDS/Session_1_-_Considerations_for_Nuclear_Energy_Programme_Implementing_Organizations_(NEPIOs)/Session_1_-_Considerations_for_Nuclear_Energy_Programme_Implementing_Organizations_(NEPIOs)/Overview_of_Egypt's_Nuclear_Power_Program_-_N._Antar_-_Egypt.pdf)

<sup>166</sup> "Russia, Egypt Sign Deal on Construction of Egypt's First Nuclear Power Plant," CNN, November 19, 2015, <http://www.cnn.com/2015/11/19/middleeast/russia-egypt-nuclear-deal/>

<sup>167</sup> "Russia to Lend Egypt \$25 Billion to Build Nuclear Power Plant," Reuters. May 19, 2016, <http://www.reuters.com/article/us-egypt-russia-nuclear-idUSKCN0YA1G5>

<sup>168</sup> Abdel Aty Salman, "Nuclear Education," Kenanonline, Web page, Archived via WayBack Machine, <https://web.archive.org/web/20161206222902/http://kenanaonline.com:80/absalman>. The content was translated for the Institute by Erica Wenig.

<sup>169</sup> Nuclear Energy Agency and the International Atomic Energy Agency, "Uranium 2003: Resources, Production and Demand," OECD, 2003, <https://www.oecd-neia.org/ndd/pubs/2004/5291-uranium-2003.pdf>

The AEA is the primary body tasked with leading Egypt's nuclear research and development and is overseen by Egypt's minister of electricity and energy. The AEA is divided into three centers: the Nuclear Research Center (NRC), the National Center for Radiation Research and Technology (NCRRT), and the HLWMC (Hot Laboratories and Waste Management Center).<sup>170</sup>

NRC and HLWMC are based in Inshas, a facility investigated by the IAEA for potential safeguards violations, described below, which is located outside Cairo. NCRRT is based in Nasr City, also outside Cairo.<sup>171</sup> Inshas is home to the shut-down ETRR-1 reactor, the operational ETRR-2, the Fuel Manufacturing Pilot Plant, a fuel laboratory, and a heavy-water laboratory, among others. AEA's website indicates the NRC employs "more than 1400 highly qualified academic scientists in various fields of nuclear science and engineering" who enjoy the support of 2,300 technical staff and 1,300 administrative staff.<sup>172</sup>

Egypt has publicly stated it interprets Article IV of the NPT as granting a 'right to enrich' and that Iran's legal enrichment under the nuclear deal legitimizes that stance. Two months after the Joint Comprehensive Plan of Action (JCPOA) was struck, Nabil Fahmy, former Minister of Foreign Affairs, proclaimed that all NPT signatories should maintain the right to domestic uranium enrichment and reprocessing of nuclear material.<sup>173</sup> Prior to this, in 2009, Egypt abstained from voting on an IAEA resolution urging Iran to explain the purpose of its secretly-built uranium enrichment plant at Fordow.<sup>174</sup>

Egyptian domestic support for the country obtaining nuclear weapons recently appeared to be unusually high. A poll conducted in 2012, shortly after Muslim Brotherhood President Mohamed Morsi came to power, showed 87 percent of Egyptians believed the country should develop a nuclear arsenal. Despite 90 percent of respondents believing Iran acquiring nuclear capabilities could pose a threat to Egypt, 61 percent said they supported Iran's pursuit of nuclear weapons. In addition, 65 percent supported Morsi's decision to reestablish diplomatic ties with Tehran.<sup>175</sup>

Egypt itself also possesses a series of missiles. As a member of the Missile Technology Control Regime (MTCR), Egypt domestically produces "complete rocket system," "capable of delivering at least a 500 kg [kilogram] 'payload' to a 'range' of at least 300 km [kilometers]," including

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<sup>170</sup> Egyptian Atomic Energy Center, "EAEA Centers," Web page, Accessed August 2017, <http://www.eaea.org.eg/centers.html>

<sup>171</sup> Shaat, "Report on, National Situation Report on, National Situation for Decommissioning Activities for Decommissioning Activities in Egypt in Egypt."

<sup>172</sup> Egyptian Atomic Energy Authority, "About Us," Web page, Accessed August 2017, <http://www.eaea.org.eg/aboutus.html>

<sup>173</sup> Nabil Fahmy, "Egyptian Concerns on the P5+1/Iran Joint Comprehensive Plan of Action," Norwegian Institute of International Affairs, September 30, 2015, <http://www.nupi.no/en/News/Egyptian-Concerns-on-the-P5-1-Iran-Joint-Comprehensive-Plan-of-Action>.

<sup>174</sup> Mark Heinrich, "IAEA votes to censure Iran over nuclear cover-up," Reuters. November 27, 2009, <http://www.reuters.com/article/us-nuclear-iaea-vote-idUSTRE5AQ1BZ20091127>

<sup>175</sup> "Egyptians Support Iranian Nuclear Program, Want Own Nuclear Weapons," The Israel Project, October 25, 2012, <http://www.theisraelproject.org/egyptians-support-iranian-nuclear-program-want-own-nuclear-weapons-2/>

control systems, software, and production equipment.<sup>176</sup> Although weapons design, and specifically the shape of a hypothetical nuclear weapon play a role, the payload of 500 kilograms make the missiles potentially nuclear-capable delivery systems. It is worth noting that Egypt has cooperated with North Korea in the missile and military realms, making a secret North Korea conduit more possible if Egypt ever sought nuclear weapons assistance.<sup>177</sup>

### Undeclared Activity Concerns

In 2004, the IAEA questioned Egypt about the nature of open source publications published by the Egyptian Atomic Energy Authority (AEA) and former officials of the AEA, “suggesting the possibility of nuclear material, activities and facilities in Egypt relating to uranium extraction and conversion, irradiation of uranium targets and reprocessing that had not been reported to the [IAEA]” and were potentially taking place at its Nuclear Chemistry Building at Inshas.<sup>178</sup> Egypt cooperated on the matter. IAEA inspections subsequently found that Egypt had imported uranium and thorium and had conducted uranium conversion experiments, uranium and thorium irradiation, and preparatory activities related to reprocessing. Many of these experiments and projects had been long ongoing.

As a result of the investigation, Egypt had to declare its inventory of nuclear materials and submit design information for three additional locations where nuclear experiments were carried out. The IAEA could account for all the declared inventory of nuclear material in Egypt. Egypt subsequently instituted stronger authorities for the AEA to exercise effective control and oversight over all of the country’s nuclear activities.<sup>179</sup> In 2007 and 2008, however, an IAEA safeguards inspection revealed the presence of LEU and HEU particles at Inshas. Egypt stated that the particles must have come from contaminated radioisotope transport containers, a claim that the IAEA stated it would seek to verify. No subsequent IAEA reporting on the matter has been made available; the IAEA did not address Egypt in any of its 2009-2016 safeguards reports except to draw conclusions that all nuclear material remained in peaceful uses.

As mentioned, Egypt refuses to sign the Additional Protocol to its safeguards agreements, which would provide the IAEA with greater information and inspection authorities for the country.

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<sup>176</sup> Missile Technology Control Regime, “Introduction - The Missile Technology Control Regime (MTCR),” Annex Handbook, August 2010, [http://mtcr.info/wordpress/wp-content/uploads/2016/04/MTCR\\_Annex\\_Handbook\\_ENG.pdf](http://mtcr.info/wordpress/wp-content/uploads/2016/04/MTCR_Annex_Handbook_ENG.pdf)

<sup>177</sup> Gardiner Harris and Declan Walsh, “U.S. Slaps Egypt on Human Rights Record and Ties to North Korea,” *The New York Times*, August 22, 2017, <https://mobile.nytimes.com/2017/08/22/us/politics/us-aid-egypt-human-rights-north-korea.html?elqTrackId=33cec4f10f954ac89038a4d88350ae1a&elq=576193aecfbd4deea1fc1fc813018327&elqaid=32017&elqat=1&elqCampaignId=19242&r=0&referer=>

<sup>178</sup> IAEA Director General, *Implementation of the NPT Safeguards Agreement in the Arab Republic of Egypt*, GOV/2005/9, February 14, 2005, [http://www.globalsecurity.org/wmd/library/report/2005/egypt\\_iaea\\_gov-2005-9\\_14feb2005.pdf](http://www.globalsecurity.org/wmd/library/report/2005/egypt_iaea_gov-2005-9_14feb2005.pdf)

<sup>179</sup> IAEA, *Safeguards Statement for 2008*, <https://www.iaea.org/sites/default/files/es2008.pdf>

## Conclusion

Egypt does not need enrichment or reprocessing plants, and U.S. efforts should focus on preventing Egypt from obtaining sensitive fuel cycle capabilities. To increase Egypt's transparency of its nuclear program, the United States should press Egypt to ratify the Additional Protocol. The United States should also work to press nuclear reactor suppliers to Egypt to provide guaranteed lifetime fuel supplies, obviating the need for domestic enrichment. Although the United States should continue its military assistance to Egypt, it should also begin to discuss conditioning it on Egypt ratifying the Additional Protocol and committing not to import enrichment or reprocessing capabilities or facilities. The NSG should also block any such Egyptian efforts to import these technologies and national intelligence capabilities should monitor any covert efforts to import or otherwise develop them. The United States should resurrect, in partnership with Egypt and Israel, regional efforts to study the methods and requirements needed to create a verifiable nuclear weapons free zone in the Middle East. A priority is the strengthening of the JCPOA, particularly by better enforcing the deal and extending the duration of the major nuclear limitations. This would prevent a renewed crisis in which Egypt may be expected to eventually pursue advanced fuel cycle capabilities.