CASPIAN SEA
INTERNATIONAL ENVIRONMENTAL
SECURITY GAME

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CASPIAN SEA
INTERNATIONAL ENVIRONMENTAL SECURITY
GAME REPORT

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FOREWORD

The Caspian Sea and International Environmental Security Game was the second annual international environmental security exercise conducted by the Center for Strategic Leadership (CSL) of the U. S. Army War College. Held at the CSL's Collins Center, Carlisle Barracks, Pennsylvania, on 16-17 November 1998, this year's exercise focused on the energy resources, geopolitics, and environmental security of the Caspian Basin. The co-sponsors of the exercise were the Deputy Assistant Secretary of State for Economics and Business Affairs, U.S. Department of State, Mr. Peter Bass, and the Principal Assistant Deputy Under Secretary of Defense (Environmental Security), Mr. Gary Vest. The purpose of the exercise was to examine the petroleum pipeline transport options in the context of U.S. National Security interests, and the increased importance of environmental issues to global energy production and transport, and to promote better communication, cooperation, and an understanding of the region's many issues and challenges.

Participants included U.S. national security policy-makers, senior international oil company executives, academics, ambassadors or other high-level representatives from the Turkmenistan, Kazakhstan, Georgian, and Turkish Missions to the United States, representatives from the U.S. Departments of State, Defense, Energy, and the Environmental Protection Agency, Central and European Military Commands, the Joint and Army Staffs, and 40 U.S. Army War College International Officers. The game was preceded by a plenary session with initial remarks by Mr. Bass and Mr. Vest, paper presentations from Robert Ebel, CSIS; Brian Shaw, DOE; MG Charles Wax, EUCOM J-5; RADM John Sigler, CENTCOM J-5; and John Daly, Georgetown University, and regional overviews by the ambassadors.

Workgroup sessions then broke into eight teams representing the governments and oil interests of Azerbaijan, Kazakhstan, Turkey, Russia, Iran, the United States, eastern and western Caspian oil producers. The game scenario drew out the diverse experience of the players and included environmental constraints on the Caspian and the issue of pipelines through Iran. In order to broaden their understanding of political issues, players were

asked to serve on other than their country's team. For example, the First Secretary of the Turkish Embassy was a member of the United States' team and represented Turkey's interests in game play. Negotiations, individual interaction between participants, role-playing, and group decision making were critical to the successful outcome of the game. This afforded participants the opportunity to explore the relationships between critical variables in a challenging and realistic environment.

I would like to commend all the players for their professionalism and dedication in examining these complicated and interrelated issues, and for agreeing to work on country teams that would not normally be of their own choosing. I particularly wish to thank our distinguished guests representing their governments from Turkey, Georgia, Kazakhstan, and Turkmenistan. The professional expertise and political insight they brought to the game was invaluable. From the perspective of the United States, the opportunity to interface with such a distinguished range of civilian business, diplomatic and governmental, military, and academic minds was exciting and most beneficial. We are confident that the international participants took away a better understanding of the United States and the U.S. military CINC Environmental Security programs.

DOUGLAS B. CAMPBELL
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Dedicated to the

U.S. Army War College

International Fellows Class of 1999

CHAPTER 1

EXECUTIVE SUMMARY

The Caspian Sea is a landlocked body of water bordered by five countries, Russia, Iran, Kazakhstan, Turkmenistan, and Azerbaijan, all but one of which (Iran) constituted part of the former Soviet Union. Though they differ markedly in size, population, ethnic composition, and political ideology, they share the common interest of maximizing the substantial energy wealth of the Caspian basin, and dealing successfully with the environmental issues that affect the explorations for, production, refining, and transport of energy resourcs. The production of energy, particularly oil, is important to a world market seeking non-Middle Eastern sources of supply, and to the national security interests of the United States, which seeks to promote the independence of the new crescent of states juxtaposed between powerful Russia and China, and the revolutionary states of Iran and Afghanistan.

Geographically isolated from world energy markets, the oil and natural gas products of the Caspian must be transported across the territories of non-Caspian states. As the cases of Dagestan and Chechnya demonstrate, the politics and the attitudes of transit states are a significant variable in the Caspian energy equation. Because environmental issues figure prominently in the Caspian oil equation, examining the nexus of energy and environmental issues offers the opportunity to broaden our understanding of the concept of environmental security and to understand the actual petroleum contributions the Caspian Basin is likely to provide.

Environmental issues become security issues when they affect the national security interests of a state. The exponential increase in the world population is felt most heavily in the developing world where it places heavy demands on the political system of newly democratic states. The legitimacy of these state governments will be determined by their ability to meet increased demands for natural resources (energy, clean water, fisheries, arable land) necessary to sustain the health, food security, and economies of their people. When these resources are found locally

in limited quantities, or the quality of the resource is degraded by overuse or pollution, the government is forced to compete for resources outside its boundaries. This competition for scarce resources has historically provided the trigger for countless conflicts and heightened regional tensions. As the global economy grows to meet demands for employment and wealth, the importance of resource access to the economies, cultures, and the vitality of states increases; this is true at all levels of socioeconomic development. The developed Western states of Canada, Spain, Great Britain, and Iceland have broached military conflict over access to dwindling fish stocks. Few resources, at this stage of man's technological development, are as globally important as petroleum. It underpins countless national strategies, drives the world economy, and compounds the geopolitical complexity of the Middle East.

The imbalance of supply and demand of oil creates resource scarcities that must be addressed if the national security of supply deficit states is to be maintained. The United States, once self sufficient in oil, must now import half of its supply and compete for access to foreign oil reserves with countries such as China, which now realizes it cannot meet its seven percent annual energy growth requirement from domestic reserves. The environmental security issue of scarce energy resources is nowhere more complicated than in the Caspian Basin, where other environmental variables influence the exploration, production, and transport of oil throughout this ethnically, regionally, and political diverse region.

The Caspian Basin is a region holding potentially large oil reserves set within a regional framework of political instability. Although reserve figures cannot be proved without further drilling and exploration, analysts agree that Caspian oil will provide a significant non-Persian Gulf source of conventional oil. Respected estimates of the economically recoverable oil reserves are between 15-35 billion barrels. These are large, but not close to the 200 billion-barrel estimate that appeared frequently in media reports. This could translate into regional production figures of approximately 3.5 millions barrels a day by 2010; significant, but only equal to roughly half of Saudi oil production. Nevertheless, the Caspian does provide an alternative to the politically complex and militarily threatened Persian Gulf's oil reserves, which contain 65.3 percent of the world's conventional oil reserves and

is being counted upon to provide approximately 90 percent of Asia's petroleum supply by the end of the next decade. Russian and Chinese interest in the region highlight its importance.

Regardless of the quantities of oil and natural gas ultimately recovered, or its relative rank in world oil sources of supply, Caspian energy serves as a spotlight for the ethnic, religious, and territorial disputes of the region, offers the economic wherewithal to underpin the former Soviet States political independence from Russia, and draws the United States into important dialogue with a host of regional powers. The geopolitical strategies of the various players are complicated and affect the national security interests of the United States from Europe and the Middle East to the Far East. Russia, long regional hegemon via the Soviet Union, benefits from pipeline revenues, but struggles against the growing economic strength and independence of the ethnically volatile states on its southern border. China, stung by exploration failures in the Tarim Basin and South China Sea and fearing unrest among its western ethnic minorities, has launched an ambitious plan to gain political influence and badly needed oil supply in Kazakhstan. Iran, well aware of the Azerbaijani majority in its northwestern region, seeks to gain regional influence over Caspian energy pipelines and Caspian oil for its northern refineries. Turkey seeks to promote Azerbaijani independence, deny Russia regional influence, protect the Bosporus, and secure a pipeline to its underutilized port at Ceyhan. The U.S. must deal with the domestic Armenian lobby which has erected political barriers to preferable pipeline routes through Armenia, ethnic dissent and Russian involvement in Georgia, and recurrent oil company interest in shipping Caspian oil through Iran.

Environmental concerns affect the recovery of petroleum globally, but the consideration given to them varies greatly. In the case of the Caspian basin, exploration and production are being conducted largely by Western oil companies in consonance with the environmental laws of the host countries. Environmental concerns have surfaced widely in the context of Caspian oil production and transport. The rising level of the Caspian Sea has complicated boundary and oil reserve ownership determination, production, and transport. Falling fish catches have drawn public attention to the petroleum industry and complicated policy making. In the transport of petroleum,

environmental issues are at the center of pipeline routing decisions. Both Iran and Russia have repeatedly raised environmental issues in their efforts to influence the choice of pipeline routes. In particular, Turkey has registered great concern over the increased flows of oil through the Bosporus that will be generated by full scale Caspian Basin production, and has said that it will limit oil flows through this strategic waterway for environmental and safety reasons.

Rules governing the commercial shipment of goods through the Bosporus were codified in the 1936 Treaty of Montreaux. At that time, only 17 ships per day passed through the Bosporus, the largest which were 13 ton grain carriers. By 1998 shipping levels had reached 110 vessels per day with 200,000 ton tankers carrying petroleum and natural gas. A series of oil tanker accidents have occurred within the waterway that have devastated the Bosporus ecosystem and led Turkey to warn that unlimited increases in oil traffic would not be tolerated. The Treaty of Montreaux does not preclude Turkey from mandating safety parameters. Mandatory double hulling of oil tankers, limited tanker size, and full tanker compliance with strict operational standards have been suggested as legal means by which Turkey may control Bosporus oil transport. This potential environmental constraint of energy transport has factored heavily in the consideration of multiple overland pipeline routes. The Center for Strategic Leadership wished to fully explore the environmental-energy nexus and its implications for the economic and geopolitical variables of the Caspian and began the game with an oil tanker disaster in the Bosporus.

The game provided key insights into the role of environmental change in national security and energy transport, and was conducted during a period of falling oil prices, a depressed Asian economy, and high unemployment in Europe. The participants emphasized the importance of the economy in their findings, particularly in a weak oil market. Market forces will serve as an honest broker and drive pipeline decisions. With world oil demand low, pipeline developers will try to resist political pressures to construct multibillion dollar pipelines, preferring to delay construction until the projected return on investment and proved oil reserves rise. Thus, in the short term, Caspian oil would likely be shipped via upgraded existing pipelines to the Black Sea ports of Supsa and Novorossiysk. Nevertheless,

maintaining political pressure for a diverse array of secure pipeline options that minimize Russian and Iranian control of oil transport will continue to be a major priority of the United States.

The environment, though not deterministic, will play a significant role in pipeline negotiations; environmental costs factor heavily in market based decisions. Concerns over increased oil transit of the Bosporus will be met in the short term by pushing more Caspian oil into the markets of the Black Sea littoral states and Eastern Europe. In the longer term, given the expected increases in Caspian Basin reserve discoveries and oil production and world market petroleum demand, environmental issues will increase in importance, particularly regarding the Bosporus. Finally, environmental security issues were seen as a valuable mechanism for engagement, having the potential to promote cooperation and improved communication between states in a region of longstanding ethnic, political and religious differences, irredentism, and territorial disputes. The success of policies aimed at promoting regional stability and sustainable economic development will turn on policy maker's understanding of the interaction of the critrical variables such as energy, the environment, culture, economics, and politics.

CHAPTER II

SCENARIO SUMMARY

In a bold move to press for action on a main export pipeline (MEP) linking Caspian oil fields with world markets, President Heidar Aliyev is convening a conference in Baku of the key players in Caspian oil affairs. In addition to Azerbaijan, the Governments of Kazakhstan, Turkey, Russia, Iran, Georgia, Bulgaria, Ukraine, and the United States are sending high-level delegations.* The major domestic and foreign oil companies that are active in Azerbaijan and Kazakhstan are represented by senior executives and experts.

This meeting is occurring at a crucial time. Just three days before the conference opened, an oil tanker, the Liberian-flagged *Spirit of Africa,* lost control of its steering mechanism and, as a result, collided with and sank a cargo ship, the *Orynsk,* in the Bosporus. The *Spirit of Africa* continues to burn and the Strait remain closed while Turkish authorities deal with the disaster. Turkish public opinion has been inflamed. This accident will have far-reaching consequences for both the ecology of the Bosporus and the future of shipping between the Black and the Mediterranean Seas.

The ecology of the Turkish Straits has already suffered serious damage. Although oil spills, like the one resulting from the accident of the *Spirit of Africa,* are ecological disasters, they are only part of the environmental problem. A far greater problem is the rapid growth in shipping through the Straits and the everyday discharges of waste and petroleum products from ships of all types. This has done severe damage to marine life in the Straits and to the ability of species, such as dolphins, which had been able to migrate through the Turkish Straits between the

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* In the exercise November 16-17, 1998, teams will play the roles of the Governments of Azerbaijan, Kazakhstan, Turkey, Russia, Iran, and the United States. The control group will play the roles of the Governments of Georgia, Bulgaria, and Ukraine whenever developments in the exercise require this.

Black and the Mediterranean Seas ten years ago to continue to do so today.

Other dramatic developments have occurred recently. Oil was discovered in the Shahdeniz field in Azerbaijan's waters. While it will take more drilling over the next 4 to 6 months to accurately assess the size of this oil field, preliminary data indicate the Shahdeniz has commercially exploitable quantities of oil. This new find has electrified the atmosphere in oil circles where there is growing speculation that oil production in the Caspian region will soon outstrip the existing and planned capacity of the system for transporting the region's oil to world markets.

The advocates of the various rival pipeline routes have become energized. Turkey, with strong support from the United States and Azerbaijan, is pushing hard for a new, large-capacity pipeline from Baku to the port of Ceyhan on Turkey's Mediterranean coast. Russia is urging a new, large-capacity pipeline from Baku to the port of Novorossiysk on its Black Sea coast. To get around the problem of the Bosporus and Dardanelle Straits, Bulgaria and Greece, with strong support from the Russians, are reviving a plan for a bypass pipeline from Burgas, Bulgaria, to Alexandroupolis, Greece.

Iran is also attracting a great deal of attention in Caspian oil circles. There is speculation that the election of the moderate Mohammed Khatemi to Iran's presidency will lead to greatly improved relations between Iran and the U.S. and that this may soon result in American sanctions against Iran being relaxed or even scrapped altogether. In addition, Iran is attempting to become a major outlet for Caspian oil. To accomplish this, Iran is offering an attractive package composed of oil swaps, of a plan to reverse the direction of existing Iranian pipelines to carry Caspian oil to the Persian Gulf, and of proposals to construct a new, large-capacity pipeline linking the Caspian and the Gulf. Moreover, Iran's state oil company owns a 10% share of the Shahdeniz field where oil has just been found.

Although President Aliyev has called for an MEP from Baku to Ceyhan for many years, nothing has happened yet for a number of reasons. First, the proven oil volumes are in need of a means of being transported out of the Caspian region and they are not sufficient to warrant the enormous expense of a new,

large-capacity pipeline. The Shahdeniz discovery may mean this will soon cease to be a stumbling block. Second, there is the issue of who will own, exercise management authority over, and profit from an MEP.

President Aliyev's patience is wearing thin. He expects this conference to resolve the issues blocking action on an MEP from Baku to Ceyhan. If he doesn't get what he wants soon, he may well shake up the structure of the Azerbaijan International Operating Company (AIOC) and replace the top leaders of the State Oil Company of the Azerbaijan Republic (SOCAR).

CHAPTER III
CASPIAN ENERGY POLICY

PETER BASS

DEPUTY ASSISTANT SECRETARY OF STATE FOR ENERGY, SANCTIONS & COMMODITIES U.S. DEPARTMENT OF STATE

There is a great deal of interest in Caspian energy issues these days - both in the press and the Administration. The appointment of Ambassador Richard Morningstar as the Special Advisor to the President and the Secretary of State for Caspian Basin Energy Diplomacy is but one sign of the importance of Caspian issues.

The activities of U.S. trade financing agencies' in the region (including the placement of TDA, EXIM, and OPIC representatives in Turkey to work on Caspian issues) are another sign. The U.S. stands ready to assist in facilitating the flow of private investment necessary to ensure full development of the region's energy resources.

The press often treats U.S. Caspian policy as being simply a pipeline policy. But it's more than that. Our Caspian policy encompasses several important goals:

- strengthening the political and economic sovereignty and independence of the new states of the region and encouraging political and economic reform;
- mitigating regional conflicts by building economic linkages between the new states of the region;
- maximizing U.S. commercial opportunities in the Caspian region; and
- through the full development of Caspian energy resources and the transportation of these resources to world markets

via multiple, "east-west" pipeline routes, improving our energy security.

Of course, our policies on Turkey, Russia, and Iran also play a strong role in our Caspian policy. We support full Turkish and Russian commercial participation in the development of Caspian energy and energy transportation routes.

We believe the Baku-Ceyhan oil pipeline route, with positive commercial incentives, is the best choice to strengthen the independence and sovereignty of the new states of the region, to enhance our energy security, to address the safety and environmental concerns regarding the Bosporus, and to meet the commercial needs of investors.

On October 29, 1998, in Ankara the presidents of Turkey, Azerbaijan, Georgia, Kazakhstan, and Uzbekistan signed a declaration that (l) recognizes that the Bosporus is not a long-term solution for a main oil export pipeline and (2) announces support for Baku-Ceyhan.

Now that the political leaders have spoken, it is our view that it's time for the companies and countries to "get down to business" - to resolve the issues necessary to make Baku-Ceyhan a reality.

Meetings to consider these issues already are taking place. We are hopeful that, even in a low oil price environment, the parties can reach agreement.

Besides Baku-Ceyhan, we specifically have identified four other pipelines that we support: the two "early oil" pipelines from Baku to the Black Sea — one running northward to the Russian port of Novorossiysk the other, running west to the Georgian port of Supsa; the Caspian Pipeline Consortium (CPC) project to deliver Kazakh oil to Novorossiysk; and the trans-Caspian, trans-Caucasus gas pipeline project from Turkmenistan to Turkey.

The CPC project is the flagship project of U.S.-Russian commercial cooperation. We estimate that over the life of the project Russia will earn $23 billion in transit revenues. CPC received the last of its rights-of-way from local jurisdictions in August and signed its construction agreement (or TEOC, as it's known in Russian energy circles) with the Russian government, November 24. The consortium expects to complete the project by

July 2001. Once on-line, the pipeline should reach a capacity of 1.340 million barrels per day.

Our underlying goal is to build "win-win" situations for U.S. and Russian companies and to get away from any tendency toward zero-sum thinking when looking at the region. Russian firms such as Lukoil and Central Fuels have already acquired shares of international consortia in Azerbaijan and Kazakhstan. We seek to encourage this sort of collaboration on pipeline and other Caspian energy projects, as the U.S. and Russian governments agreed during our last Summit meeting in Moscow. We even hope to see Russian companies gaining access to global markets by lifting their oil onto supertankers in the Mediterranean via a commercially competitive Baku-Ceyhan pipeline.

Last month, Turkmen President Niyazov received the initial results of their TDA- financed feasibility study of a trans-Caspian pipeline. Formation of a consortium to carry out construction of the pipeline should take place early next year.

We believe the trans-Caspian pipeline is critical to Turkmenistan's independence. Currently, Turkmenistan is only earning gas export revenues from shipments of gas to Iran and through Russia - both of which are long-term gas export competitors.

While it is critical for Turkmenistan that the pipeline be built, it also is important for Turkey which needs gas to meet its growing demand for electric power. (Gas-fired generators will supply the bulk of the increased power demanded.) If it's a good fit for both countries, it's good for us too, since as a matter of policy, we oppose the use of pipelines that originate in or transit Iran.

It is difficult to overestimate Turkey's role in the success of efforts to develop east-west transit routes for the Caspian region's oil and gas.

It is equally difficult to overestimate the benefits to Turkey: greater energy security and greater engagement with its neighbors in the Caucasus and Central Asia

With respect to oil, Turkey must provide the necessary legal and the tax, tariff, and commercial incentives and guarantees to persuade companies to invest in Baku-Ceyhan.

With respect to gas, Turkey must resist the temptation to rely on Iran.

Also, with respect to electric power plants and other infrastructure currently on the drawing boards, Turkey must improve the legal environment for investment to ensure these facilities are built. U.S. and other foreign companies are hesitant to sign contracts without some assurance that adequate dispute settlement mechanisms are in place.

Impact of Low Oil Prices

Low oil prices could affect the timing of many Caspian energy decisions. The price of West Texas Intermediate oil, the U.S. benchmark, has fallen about 40 percent over the past year. The scenario for future oil prices remains uncertain.

Accordingly, we might see some firms defer development of new fields and think more carefully before committing to new pipelines. There may be moves to expand some existing pipelines, instead. These are commercial decisions, but we hope that whatever decisions are made are in the long-term interests of the companies involved and of the contrails of the region.

A few comments on Iran and sanctions policy...

Iran and Iran Sanctions Policy

The U.S approach to Iran is to welcome positive trends (i.e., Khatami's election, increased freedom of the press, the announcement on Salman Rushdie), offer official dialogue with the Iranian Government, and pursue cultural and other private exchanges, while maintaining economic sanctions including opposition to investment in Iran's energy sector and to pipelines across Iran.

However, to date the Iranian government has said that it is not ready for official talks.

Our concerns with Iran have not changed. Iran continues to develop weapons of mass destruction and their delivery systems. Iran also continues to support terrorist groups.

We will maintain our economic sanctions until we see verifiable changes in Iranian policies on terrorism weapons of

mass destruction, missile procurement and human rights. In the end, our policies will be determined by the Iranian government's actions.

Concerning the Iran and Libya Sanctions Act, we stand by the US-EU understanding concerning the expectation with respect to EU firms announced by the Secretary of State last May. But that understanding does not mean that waivers will automatically be granted to such firms in future ILSA cases involving Iran. An expectation is not a guarantee. Every case will have to be reviewed, and a decision made on that action — among the options prescribed by the law — to take.

ENVIRONMENTAL SECURITY

GARY VEST

PRINCIPAL ASSISTANT TO THE DEPUTY UNDER SECRETARY OF DEFENSE FOR ENVIRONMENTAL SECURITY U.S. DEPARTMENT OF DEFENSE

A short explanation of my position as the Principal Assistant to the Deputy Under Secretary of Defense for Environmental Security would serve as a helpful introduction to our exercise. It would also be appropriate to give a short discussion of the Department of Defense's efforts in Environmental Security because it has bearing on why we are here.

Nearly six years ago Les Aspen, the new Secretary of Defense, and his key advisors began to frame his approach to defense policy. One thing they decided to embrace was what they called Environmental Security. In talking about environmental security they also began to talk about economic security. So, about six years ago the notion was that the end of the Cold War afforded an opportunity for the United States Department of Defense and defense leaders to broaden their efforts. We could look at some things other than what had been our preoccupation for the past 50 years. As a result, Secretary Aspen created the office of The Deputy Under Secretary for Environmental Security. In the course of forming that office, the new Deputy Under Secretary, Sherry Goodman, and myself, as her principal Deputy, began to frame the Department of Defense Environmental Security program. We did so in an interactive way with our boss at the time, John Deutsch, and Bill Perry, who was then the Deputy Secretary of Defense. Dr. Deutsch subsequently became the Deputy Secretary of Defense, and then the Director of Central Intelligence.

In the course of this framing exercise we continued to embrace the environmental missions of the Department of Defense that had been evolving for nearly 30 years. However, we also added

three dimensions that actually became part of the charter for the Deputy Under Secretary of Defense for Environmental Security. The first of these charters, or missions, was to do what was necessary to bring to bear related environmental matters in the development of national security policy defense. Put another way, what we were asked to do was to engage in a very aggressive, full way with the development of policies in our government where there was an interaction between environmental and national security interests or policies.

A second mission we were charged with was to determine how and under what circumstances the Department of Defense, or its components, could be used as instruments of a national environmental policy. This very much touches on one of the second dimensions that Dr. Kent Butts mentioned in his opening remarks. This meant that we were to engage and develop, based on what has now become this nearly 30 years of experience, capability, and capacity. We were to engage in the international arena on military related environmental matters. That meant fully engaging in military-to-military activities. It is a footnote that the environment has been a major part of the European military-to-military program in the former Soviet Union and former Warsaw Pact countries. At last report, over 60 teams had been sent into those countries to address environmental issues.

The third mission of our charter had to do with the furthering of the state of knowledge on the relationships between environmental forces and phenomena in national security interests. This exercise at the Collins Center is, in essence, part of that process that we have been engaged in now for nearly six years. It is the pursuit of knowledge and better understanding. Several years ago then Secretary of Defense William Perry read a speech at Harvard University putting forward a concept of preventive defense. Essentially what Secretary Perry said was that we need to be focusing on preventive aspects of national security as well as traditional deterrence, the traditional building and maintaining capability to engage. He included within preventive defense the concept of environmental security. As we began to work environmental security within the preventive defense concept, we began to appreciate that in order to have peace and stability there needs to be some semblance of quality of environment and, in turn, quality of life. As we dove into it more, we began to better understand that there is a very strong

relationship between environment, energy, economics, and national security. Yet, what had not happened in the past was the pursuit of these relationships to bring the result to bear on key decision-making in the Department of Defense. So, in cooperation with the Army War College, the Collins Center, and many other parts of the Department of Defense we have embarked over the last several years in the pursuit of this knowledge.

As we step back now and look around the world, some obvious places catch our attention. The Caspian Sea/Central Asia area is obviously one of them. There are others, but this game will focus on Central Asia and the Caspian.

Our activities in defensive Environmental Security in an international sense have been extensive within the NATO context. We currently have a number of trilateral and, in some cases, quadri-national activities. It struck me that many of the countries represented by the International Fellows here from this year's class of the Army War College have formal environmental military cooperation agreements today. These would include South Africa, Australia, Czech Republic, Hungary, Russia, Sweden, Norway, Italy, and Argentina. We are engaging throughout the world and we do so in pursuit of peace. We do so to contribute to stability. We do so in the hopes of avoiding conflict.

We are very hopeful, very excited about this exercise. Given the capabilities, experience, and the insight that those in this room bring to this subject, this should be a very noteworthy, if not landmark, session on this topic.

So with that introduction and background we welcome you to the Collins Center. We thank you very, very much for taking time out of your busy schedules to come to Carlisle and participate. We look forward to great results that we will be able to take back to the Pentagon, to take into the Joint arena and provide to the senior leadership of the Department of Defense, so as they go about their business of making policy decisions and guiding the department, they will have the full benefit of your knowledge and experience.

CASPIAN BASIN OIL AND GAS: AN OVERVIEW

ROBERT E. EBEL

DIRECTOR, ENERGY AND NATIONAL SECURITY CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES WASHINGTON, D.C.

The producing potential of the Caspian Sea basin has caught the eye of the major international oil companies for several reasons.

- First, nothing is quite so attractive as something which in the past has been denied but which is now available.
- Second, the Caspian producing potential is world-class.
- Third, this potential cannot be realized within an acceptable time frame without outside participation.
- Fourth, and perhaps most important for the foreign investor, the oil will not be developed to meet domestic requirements. Domestic requirements are comparatively small and are expected to remain that way. Most of the oil to be produced will be for the export market.

Prisoners of Geography

Azerbaijan and the Central Asian states are prisoners of geography. While the end of the Cold War may have changed a number of things, it could not change the physical isolation of these countries from western oil and natural gas markets. Russia to the north, Iran and Iraq to the south and southwest, Afghanistan to the southeast—all effectively block the way.

Which means that, given limited domestic requirements, construction of export pipelines must precede any expansion in production. At present, there appears to be just three firm pipelines, all oil:

- Baku-Novorossiisk
- Baku-Supsa
- Tengiz-Novorossiisk

The question is, what is the driver in pipeline route selection? It is more political in this part of the world, and less economic. Pipeline route selection, because of the political implications, is all-important. However, final route selection should not reflect last week's or last month's political developments. *Pipelines are like diamonds; pipelines are forever*. Planners try to picture what the region might look like 5 to 10 years from now. Surely, the Caspian region and Central Asia will be quite different from today, but in what way is difficult to say.

Some hope that pipelines could help bring peace to the region. For example, Armenia would like to see a pipeline carrying Caspian oil to western markets, to be built across its territory. That, in their estimation, would help resolve the Nagorno-Karabakh issue. Similarly, the United States is pushing for a gas pipeline to be built from Turkmenistan westward across the Caspian Sea to Azerbaijan, explaining that such would resolve the issue of where to mark the water boundary between those two countries.

However, I would emphasize that *a pipeline can follow peace, but peace cannot follow a pipeline*. In my estimation, for example, the governments of Armenia and Azerbaijan are, in themselves, not strong enough to sit down at the negotiating table and work out a solution to the Nagorno-Karabakh issue that would be acceptable to both sides, and that means a solution also acceptable to the Armenian diaspora.

Turkmenistan lays claim to all or part of two of the three oil fields being developed by the Azerbaijan International Operating Company (AIOC), a consortium currently developing three oil fields in the Azeri sector of the Caspian Sea. Additionally, Turkmenistan lays claim to the Kapyaz oil field which appears to

straddle the median line between Turkmenistan and Azerbaijan. Can it be assumed that construction of a pipeline westward from Turkmenistan across the Caspian to Baku will be sufficient reason for these two parties to reach agreement on ownership of the fields in question? Unlikely, at best.

Much is made of the oil potential of the Caspian, perhaps too much. Translating an oil potential into actual production will not be an easy task, if only for the political and bureaucratic hurdles to be faced. *Potentials* cannot and do not fill a pipeline. Which means that pipeline availability must be matched with oil production capacity. One without the other is useless.

Selecting Pipeline Routes

Countries solicit the construction of pipelines across their lands for three reasons:

- for transit fees, which can be considerable over time,
- for the anticipated economic stimulus to the transit regions, and
- for the political and economic leverage conferred.

In sum, these routings will define future corridors of power and of trade.

The issue of pipeline construction in this region is often referred to as the great game. Games, by their very definition, conclude with a winner and a loser. To date, in this great game, there have only been winners. The U.S. policy of multiple pipelines has seen to that. But eventually, there will be losers, and will the loss be accepted quietly, or not? Has the great game become the great gamble?

A cynical observer would find it easy to conclude that it would be in Russia's best interests to keep the pot boiling between the United States and Iran, to keep Armenia and Azerbaijan from finding a solution to the Nagorno-Karabakh issue, and to see to it that separatist activity inside Georgia keeps that country in turmoil. Why so? To present Russia as the more logical, and offer the more secure route for moving Caspian oil to western markets.

The U.S. Position

The U.S. position on the Caspian and Central Asia has been laid out for all to see: multiple pipelines, oil supply diversification, supporting construction of a large-diameter pipeline from Baku to Turkey, saying "no" to Iran as a transit country, and minimizing oil flows across Russia. The United States sees the political and financial independence of Azerbaijan and Central Asia as being enhanced by its pipeline policy.

A policy denying Iran a role in Caspian development may be ill-advised. Although the United States has serious differences with Iran over support of terrorism, the desire to acquire weapons of mass destruction, and interference in the Middle East peace process, an Iran excluded may be more willing to engage in mischief than an Iran included.

The U.S. policy is also presented in terms of advancing national interests. Clearly, it is not the volumes of Caspian oil that will advance U.S. interests, for these volumes will be relatively small in terms of contribution to world oil supplies. Moreover, little if any of the Caspian oil is likely to find its way to the U.S. market.

Our national interests therefore must rest with the continued and strengthened political and financial independence of Azerbaijan and Central Asia. But if their political and financial independence derives largely from uninterrupted oil and gas flows to western markets, would the United States therefore be prepared to intervene, to protect these oil flows against threats of disruption, if their independence is so important to us?

Differing Perceptions

The United States regards Caspian resource development as a "win-win" situation. The exporting countries solidify their political and financial independence. The world oil market wins additional suppliers, always helpful as oil importers seek to minimize dependence on any single source.

But Russia does not see it quite that way. To the contrary, if Azerbaijan and the Central Asian states solidify their political and financial independence, then Russia surely loses. Because,

from whom are they winning their independence? It is from Russia, of course. That makes it a zero-sum game.

And for the exporters, it is also not much more than a zero-sum game. For the question arises, at what point in time will that sought-after political and financial independence actually be secure? A Russia, standing on the precipice of an economic and possibly political meltdown, cannot be particularly reassuring to the Caspian states.

Politicizing a Commercial Decision

At present, just a single pipeline—Baku to Novorossiisk— is available to transport Caspian oil to western markets. A second line, from Baku to Supsa, will be available in the Spring, 1999. The combined initial carrying capacity of these two lines will somewhat exceed 200,000 b/d but could be expanded substantially through the construction of additional pumping stations. Pipeline capacity should not be a constraint on AIOC crude oil production levels for perhaps the next five years or so. Yet debate now centers on the selection of a large diameter export pipeline to carry later Caspian oil to western markets.

A recommendation on a large diameter export pipeline is to be made to the Azeri government by the AIOC in December but deadlines for action in this part of the world do not carry much authority; failure to meet a deadline is of little immediate importance. Multiple companies, with differing agendas, complicate the decision-making process even beyond the pressures being brought by the United States. The AIOC review has focused on three options: Baku-Ceyhan, Baku-Novorossiisk, and Baku-Supsa.

Russia, in the interim, has come forward with a proposal to build the main export line across its lands, proposing a Baku-Novorossiisk route, bypassing Chechnya, but otherwise paralleling the presently operating Baku-Novorossiisk line carrying early AIOC oil.

If recent media reporting is accurate, the AIOC will not recommend construction of a main export pipeline from Baku through Georgia to the Turkish port of Ceyhan at this time—a proposed route on which the United States has spent considerable political capital and which is strongly supported by

Azerbaijan, Georgia, and Turkey. Early construction of Baku-Ceyhan is turned aside for a variety of reasons: too expensive at this time of low oil prices; not enough oil to fill the pipeline; adequate inducements to begin construction sooner rather than later have not been offered; and the prospect that the U.S. isolation of Iran may come to an end, sooner rather than later, thus putting Iran into play as a transit country.

The United States has worked diligently to ensure that the AIOC fully understands the political ramifications behind selecting the Baku-Ceyhan route. The U.S. policy is centered on four key considerations:

- continue to isolate Iran,
- restrict Caspian oil flows through Russia,
- aid Turkey, a valued NATO ally, politically and financially, and
- respond to Turkey's concern about increased tanker traffic through the Bosporus.

Additionally, the United States has worked behind the scenes to convince Turkey that it must offer financial incentives to the companies if the pipeline is to be built, which Turkey has: transit fees would only cover costs and would not be profit-making; a full tax holiday would be granted.

The U.S. government recognizes that current and near-term crude oil supply does not justify construction of a large diameter export pipeline from Baku to Ceyhan at this time. Yet, the United States continues to press for a commitment by the AIOC to build the pipeline, with the construction time-table subject to "milestones in production levels." It would appear then that such a commitment, if forthcoming, would validate U.S. pipeline policy, at least in the eyes of U.S. officials.

There is a danger in the all-out effort by the United States to secure construction of the Baku-Ceyhan pipeline. The United States is making the mistake of politicizing Caspian oil development, substituting political justification for economic justification, and setting an unfortunate precedent at this very early stage of Caspian and Central Asian oil and gas development.

If the United States can play politics with Caspian oil, so then can others.

The Tengiz-Novorossiisk Pipeline Is Of No Concern

In apposition to the Baku-Ceyhan line, the pipeline from Tengiz to the Russian Black Sea port of Novorossiisk (generally referred to as the CPC pipeline) and the impact this pipeline will have when it becomes operational on a tanker movement through the Bosporus have been generally ignored by the United States. Consider that the first phase of the CPC pipeline will be able to handle 560,000 b/d and, upon completion of the second phase, carrying capacity will expand to 1.34 million b/d sometime after the year 2010, far in excess of what a large diameter pipeline to Supsa might handle. There will be adequate capacity in the CPC line for other crude oils as well, perhaps from Kashagan and from Karachaganak.

When questioned as to why the United States was basically ignoring the CPC line, U.S. officials waved off any concerns by observing that much of this oil would find homes in the Black Sea region, that is, in Ukraine, Romania, and Bulgaria perhaps. If oil out of Novorossiisk could stay in large part inside the Black Sea, so could oil from Supsa.

Would Baku-Ceyhan Be Secure?

Can the route of the Baku-Georgia-Ceyhan pipeline be regarded as secure? Of course not. Azerbaijan is not secure, in part because of its conflict with Armenia over Nagorno-Karabakh. A cease-fire has been in place now for several years, but there is no guarantee that it will be permanent. An export pipeline, bypassing Armenia enroute to Georgia, will make an attractive target for dissident activity. Similarly, opposition forces inside Georgia and the continued attempts on the life of the president, contribute to that country's instability, and the separatist Kurdish movement in northern Iraq presents another set of problems.

Yet, oil producers have learned to live with pipelines operating under hostile conditions. No better example can be found than in Colombia, South America, where a pipeline carrying oil from the interior of the country to a port of export has

been blown up 61 times so far this year. More recently, producing wells have also come under attack. Not only do the rebels blow up the line and oil wells, they also collect a 10 percent commission from contractors hired to repair the pipeline and the wellheads, so the media reports. Companies learn to live with these facts of life in Colombia, and elsewhere. Oil exports mean oil income, and few would want to foreclose on that.

The Colombian pipeline provides employment and income, but only when operational. A closed pipeline is of value to no one. We need only recall the considerable concern expressed about a pipeline carrying AIOC oil north to the Black Sea port of Novorossiisk, passing through rebellious Chechnya. Although I am not privy to any arrangements which might have been worked out between Russia and Chechnya, oil continues to flow through this pipeline, generally unimpeded. Presumably, the interests of Chechnya are being satisfied.

How Much Oil and Gas, and Where is it Going?

As we think about the future, we must remind ourselves from time to time of the oil industry's tendency to overestimate the unknown, and to underestimate the known. The oil potential of the Caspian Sea, for example, has been placed as high as 200 billion barrels but to put that potential to work, if the oil is there, is going to be difficult. More realistically, proven reserves more likely fall within the 20 to 35 billion barrel range. Even that range may be optimistic, given today's low oil price. Nonetheless, industry places a high premium on the undiscovered resource potential of the Caspian. That is the main driver behind their commitment to the region.

The media, in its search for eye-catching headlines, has been careless in its assessment of the Caspian contribution to world oil supply. Some have even concluded that at long last a rival to the Persian Gulf has been found. Not so.

This new oil is not going to be a substitute for Persian Gulf oil, not in terms of levels of production, not in terms of costs of production, not in terms of ease of access to world markets, and certainly not in terms of reduced political risk.

Consider the more important constraints on the development of Caspian and Central Asian oil and gas:

- landlocked, with no easy access to western markets
- delays in pipeline availability, for whatever reason
- politically disruptive elements in transit countries
- a generally inadequate supporting infrastructure and a shortage of drilling rigs
- differing opinions and agendas on the part of consortium member-companies

By the year 2010, the new oil from the Caspian and Central Asia might reach 2.5 million b/d, representing in very broad terms less than 3 percent of world oil supply. This production level presumes pipeline availability and timely and successful field development. These are very big risks. Two projects offshore Baku have already come up short in terms of producible oil.

The projected supply increment of 2.5 million b/d should be kept in perspective. Consider that Venezuela has plans to increase its oil production by a roughly comparable amount—some 3 million b/d—by the year 2007. Yet this increment is barely recognized, while Caspian oil has been accorded star status by the media.

Caspian oil will play an important role **at the margin**. Most importantly, it will add to diversity and security of supply for importers, but its role will not be pivotal. Indeed, low oil prices and the prospect for no immediate improvement casts some doubt over the promised bright future for this region. Also are investors looking over their shoulder today at Saudi Arabia and Iran, and later—even Iraq? If these countries open up their upstream sectors, how much capital, which might have been directed to the Caspian, might now be re-directed, at Caspian expense?

A Scenario

All the pressure is on the AIOC. What might happen if the Baku-Ceyhan pipeline is delayed, and a visibly upset Turkey—which has been playing its Bosporus card for all its

worth—decides to take retaliatory action by employing the Straits as a political weapon? Turkey, through a variety of actions, could seriously delay tanker movements through the Straits, as it appears now prepared to do. Turkey might find a rationale for more drastic action, perhaps following an accident where an oil tanker spill endangers Istanbul, perhaps employing their navy to stop tankers if they believed it was in their national interests to do so. An affected U.S. company then turns to the U.S. government, asking that an escort be provided. What then? Confrontation prospects are very real.

Can Turkey simply close the Bosporus to traffic? No, not under the Montreaux Convention of 1936, which guarantees free passage through the Straits. But Turkey can make life difficult for tanker owners. Just recently Turkey imposed new navigation rules for the Straits as part of its continuing effort to "sell" the Baku-Ceyhan export pipeline.

Under these new rules Turkey can demand more advance notice for the passage of a vessel through the Straits. Turkey can also stop any vessel on legal grounds and can require more ships to use local pilots and Turkey can raise transit fees by a factor of five. These steps are designed with one goal in mind: to make the Bosporus as economically unattractive a route for Caspian oil as possible.

Employing the Turkish Navy is a worst case scenario. What truly makes this scenario more interesting is that it can be regarded as a most likely scenario as well.

How deep is the Turkish concern for the dangers which they believe will accompany increased oil flows through the Straits? If such were the case, the Turkish government could propose construction of a pipeline bypassing the Straits. A relatively short, comparatively inexpensive pipeline bypass could be built, on Turkish territory, but a formal proposal has never been made. Bypass pipelines have been proposed but not across Turkey.

Ticking Time Bombs

There are a number of ticking time bombs to be found within the confines of the Caspian and Central Asia. They are, in no particular order of priority:

- **Azerbaijan, Turkmenistan, Kazakhstan Leadership**

The strength of these countries has been in the strength of their presidents. These countries would not be where they are today without that leadership. However that is also their weakness as they move towards democracy and a free market economy. Would an untimely departure lead to power vacuums and to civil unrest?

- **Unrealized Expectations by the Population of Azerbaijan, Kazakhstan, Turkmenistan**

Press releases accompanying the signing of another production sharing agreement between a host country and foreign investors speak of billions of dollars in forthcoming investments and billions of dollars in profits to the host governments. Monies are spoken of in a way to make them appear almost as a given. Future investments and profits are not a given by any means, and unrealized expectations may lead to conflicts between investors and the host governments, and between the host governments and their populace.

- **Delay in Development of the Oil and Gas Sectors**

The political and economic future of Azerbaijan, Kazakhstan, and Turkmenistan are very much linked to the timely and successful development of their oil and gas sectors and the export of these fuels to western markets. Developments in the world oil and energy market hold just as many implications for these countries as for any exporting country, if not more. A succession of years in which oil and energy prices remain low would be very disheartening, very discouraging for them.

- **U.S. Government and U.S. corporate interests in the region may not always coincide.**

U.S. corporate interests in the Caspian—access to oil— will not change. However, the future may find actions by the governments of Azerbaijan, Kazakhstan, and/or Turkmenistan to be unacceptable. Sanctions are applied. What then?

- **Losers in the game of pipeline politics.**

When export pipeline routes are chosen, there will be winners and losers. Losers in the great game of pipeline politics may take action to restore their bargaining position.

- **Another choke point.**

The U.S. pipeline policy for Caspian oil and gas and its support of a transeurasian corridor, if realized, will produce an oil and natural gas transit choke point near Baku, posing a threat to security of supply.

ENVIRONMENTAL BASELINE ANALYSIS OF THE CASPIAN SEA REGION

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Summary

Introduction

The independent countries surrounding the sea are Russia, Azerbaijan, Iran, Turkmenistan, and Kazakhstan. Although the Caspian Sea lies inland, thousands of kilometers from the oceans, it has many marine characteristics and one connection to the Black Sea via the Volga-Don River network. It supplies food, water, industrial opportunities, and oil and gas to its surrounding nations. The past history of the Caspian Sea reveals an environmental system that is highly stressed by natural factors and human use. Into this already stressed system, the future development of oil and gas resources has the potential to introduce environmental impacts that could add fuel to existing regional tension around national security, fishing resources, water quality, oil and gas rights, pipeline routes, and land use. It appears that there is significant potential for the environmental events to help trigger instability among the bordering nations of this region.

The following report presents a baseline of the environmental status and stresses in the Caspian Sea region together with a brief framework of the regulatory issues. From this baseline, the issues that have the potential to escalate tensions in the region are highlighted.

Environmental Baseline

Environmental Setting

The Caspian Sea is usually described as having three basins: northern, middle, and southern. Other notable physical features are the Volga River, which drains 1,380,000 km^2 {SAT1} and contributes 78% of the annual water input to the Caspian Sea, the Volga River delta, and the Kara Bogaz Gol Gulf.

Regulatory Baseline

The main legal issue in the Caspian Sea region rests on definity of the body of water as a *sea* or as a *lake*. In the former case, the Geneva Convention on the Sea-Shelf of 1958, and the United Nations Convention on the Law of the Sea (UNCLOS) would apply; if it were defined as an inland lake, it would not be

covered by these laws. If UNCLOS were applied, the sea would be legally partitioned to national sectors by equidistant division of the sea and undersea resources. Of the five littoral states, Azerbaijan and Kazakhstan call for UNCLOS to be applied; Kazakhstan adds that cooperation on the environment, fishing, and navigation would be beneficial. Russia and Iran argue that the enclosed Caspian Sea, defined as an inland lake, should not be governed by the UNCLOS, but rather, that each nation should have a 45-nautical-mile exclusive economic zone (EEZ), with joint development and management of resources in the area beyond the set boundaries. Environmental protection, and resources such as fisheries and oil could be managed or developed jointly outside the EEZs.

There are several treaties and agreements for international cooperation in the Caspian Sea region, some with support from the World Bank and other agencies. Within the littoral states, there are various levels of regulation and interest in environmental issues. Other joint efforts and treaties in the region are concerned with oil development and transportation issues.

Sea Level Changes

The rising sea level in the Caspian has been attributed to a combination of factors that include changes in river drainage and water use, increased precipitation, reduced evaporation, oil pollution, and tectonic shifts. The 1.5-m sea level increase is creating regional problems due to inundation of coastal regions, salt water intrusion, loss of homes, loss of fisheries and resources, transportation infrastructure, and threats to human health.

Water Quality

Water quality of the Caspian Sea has been on a continual decline over the past years. Sewage and wastewater from Russia are entering the Caspian via the discharge of the Volga River. Large and more pressing issues are the historic petroleum industry, post-Soviet burgeoning oil and gas development, and corresponding incidents of oil pollution. Some effects are seen in the decline of the sturgeon and caviar production, a major economic resource and cultural identity issue. In addition, reports of ecological damage from the persistent use of DDT as a pesticide and from toxic defoliants used in cotton production need to be evaluated.

Nuclear Baseline

In the Caspian Sea region of Central Asia, there are several nuclear reactors used for power production and research, and many nuclear sites remaining from activity of the Former Soviet Union (FSU), including those of uranium mining and production, nuclear waste dumping, storage, fuel production, and peaceful nuclear explosions. There is potential for leakage from some of the latter sites, exacerbated in some areas by the inundation resulting from Caspian Sea level rise.

Fisheries

Fisheries in the Caspian Sea in general do not present a point for potential regional conflict. Most major commercial stocks are mobile and at stock levels beyond present harvest capability due to fisheries infrastructure failure in the FSU countries. High-profile species such as sturgeon are at risk, but their decline would affect only local populations of harvesters and poachers on a seasonal basis. Poaching is a local and seasonal issue in the north and mid-Caspian, and will likely decline with the increase in catch per unit effort that accompanies overharvest. Alternative sturgeon and caviar sources in Iran, North America, and China and the usual market forces mean a supply of caviar and smoked sturgeon will exist for export markets, even if the major sturgeon fishery on the Volga delta were to fail. The Caspian seal is likewise not a major issue at present, because stocks must be controlled as long as fish stocks remain low. Water pollution issues seem to be declining in the face of industrial shutdowns in the FSU and International Standards Organization (ISO) environmental restrictions on products destined for the European Union (EU). Poaching is a local and seasonal issue in the north and mid-Caspian, and will likely decline with the increase in catch per unit effort that accompanies overharvest; sturgeon in short supply would no longer be an easily available resource.

Oil and Gas Development

A critical issue facing the region is the development of oil and gas reserves. The Caspian Sea and associated basins contain the third largest reserve of oil and natural gas in the world, behind the Gulf region and Siberia. Drilling for oil in the region is not new. Oil derricks dotted the landscape during the latter decades of the nineteenth century. Oil for large-scale oil exploration was a

major source of hard currency for the FSU, but drilling methods were technologically inferior compared with those of Western firms. This inhibited Soviet exploration in the Caspian region. In the mid-1980s, the Soviet Union's oil exploration sector was poised to reap benefits from the Western technology and investment; the breakup of the Soviet Union, however, put a hold on these plans, because several nations claimed sovereignty in the FSU lands around the Caspian Sea.

There are significant environmental concerns associated with drilling for oil in the Caspian region, in addition to those of the act of drilling. The major political as well as environmental issue is the best way to deliver the oil to world markets from the landlocked Caspian region. The most efficient oil transport likely would be by pipeline, but the exact route is undecided, and may prove to be the single most important factor in determining the ultimate success of oil exploration in the region.

Heavy tanker traffic thorough the Mediterranean, Red Sea, and Persian Gulf have already alerted states to the pollution potential of such activities. Increased production in the Caspian region could increase the above effects, no matter which pipeline route is eventually chosen. Unique to the Caspian region, however, are the ongoing sea-level changes. The sea could rise possibly 3m in the next 25 years, with consequent environmental damage. In the last decade, it rose 1 m, already inundating some parts of Baku. Some of Iran's most productive fields lie on the southern shores of the sea and could be submerged if the sea were to continue to rise.

Environmental Vulnerability

Even if there were a single country that surrounded the Caspian Sea, there would still be problems and tradeoffs within solutions related to the sea level rise, pollution, and resource development; that is, the environment would still be vulnerable to damage, regardless of national politics. However, because there are multiple countries involved, shared legacy pollution and management issues, emergent highly profitable resources, divergent cultures, and debates over the scientific explanations for the sea level rise, there is no doubt that there will continue to be environmental vulnerability associated with the Caspian Sea level rise.

The most likely primary point for fisheries-related conflict comes from the mixture of religion, economics, politics, and fisheries aquaculture that exists in the southern Caspian Sea. Iran and Turkmenistan cooperate in aquaculture interests. Combined with the major investment in aquaculture in Iran and the desire to maintain hegemony in the south Caspian in oil and fisheries, Iran could possibly initiate local- to regional-scale conflicts, if its aquaculture program were seen to be threatened. Potential ecological threats could include those due to spreading pollution from shoreline sources or to introduced species in tanker ballast water, or to ecoterrorism over oil rights/boundary issues and poaching.

Impacts are possible from five general elements of the oil and gas industry: exploration; drilling; production; gathering, transportation, and distribution; and refining and processing. Each of these elements has unique activities and vulnerabilities. By far the greatest vulnerability to large-scale environmental damage is the pipeline infrastructure. Given the overall age and condition of existing pipelines and the proximity to the Caspian shoreline, which is changing, the likelihood of severe compromise of the system is high. Nonetheless, there are several concerns associated with each element.

Introduction

The Caspian region is quickly emerging as a focal point for environmental security issues arising from international environmental tensions. The Caspian Sea has been and is becoming more economically important to its bordering nations for its abundant energy resources and unique fisheries resources. Following the breakup of the FSU, international energy firms focused their attention on the Caspian Sea region seeking to develop and use the potential reserves of oil and gas. The Caspian Sea had already commanded much attention scientifically, because of rising sea levels and sturgeon fishery depletion. Underlying the future of Caspian Sea and the use of its resources are the needs to resolve regional conflicts, provide economic and humanitarian assistance to distressed regions, remove nuclear weapons and waste, and negotiate lasting treaties and agreements.

The independent countries surrounding the sea are Russia, Azerbaijan, Iran, Turkmenistan, and Kazakhstan. Although the Caspian Sea lies inland, thousands of kilometers from the oceans, it has many marine characteristics and one connection to the Black Sea via the Volga-Don River network. It supplies food, water, industrial opportunities, and oil and gas to its surrounding nations. The history of the Caspian Sea reveals an environmental system that is highly stressed by natural factors and human use. The future development of oil and gas resources has the potential to introduce environmental impacts that could add fuel to existing regional tension around national security, fishing resources, water quality, oil and gas rights, pipeline routes, and land use. It appears that there is a significant potential for environmental events to help trigger instability among the region's bordering nations.

The following report presents a baseline of the environmental status and stresses in the Caspian Sea region together with a brief framework of the regulatory issues. From this baseline, the issues that have the potential to escalate tensions in the region are highlighted. The Caspian Sea is the topic of some summary books, and in key areas, some in-depth scientific information. Environmental impact statements from resource development firms, as well as overview of climate-related sea level rise controversies and intense debates over the decline of the sturgeon

fishery are beginning to emerge. There is a wealth of information on the INTERNET; the various web sites feature each country's' viewpoint and particular special interest viewpoints. The report below summarizes the environmental issues as they are featured in the overview documents, on the INTERNET, and from scientific journals. Although we include the information from the INTERNET, we treat it as unconfirmed, rather than as peer-reviewed information, and we seek to confirm the issues with the scientific journal articles.

After a description of the environmental setting, the organization of the report features the following issues: regulatory baseline, sea level changes, water quality, nuclear baseline, fisheries, oil and gas development, and a summary of environmental vulnerability, security implications, and recommendations.

Environmental Baseline

Environmental Setting

The Caspian Sea is unique in its size and its characteristics. It's the world's largest inland body of water, located in a large continental depression about 27 m below sea level, with no surface outlets and with varying salinity and water levels, it is described either as an inland sea or as a lake (Figure 1). It is usually described as having three basins (Figure 2). Other notable features are the Volga River, which drains 1,380,000 km^2 and contributes 78% of the annual water input to the Caspian Sea (Kaplin 1995), its delta (Figure 3), and the Kara Bogaz Gol Gulf (Figures 2 and 4). Including the Volga, there are over 130 streams and rivers that flow into the Caspian Sea. In the northern Caspian, the Ural and Terek Rivers contribute 10% of river water; in the west, the Kura and some smaller rivers account for 7% of the inflow; and the remaining 5% is contributed by rivers in Iran (Figures 4 and 5). There is no river on the eastern littoral that reaches the sea (Kaplin 1995). As in other large, closed-basin lakes, the water level depends in part on the balance between precipitation and evaporation (Rodionov 1994). A map of the catchment area of the Caspian Sea is shown in Figure 5. Basic characteristics of the Caspian Sea are shown in Table 1.

The Caspian is surrounded in the north and east by semidesert lowlands and tableland deserts; in the south, it is

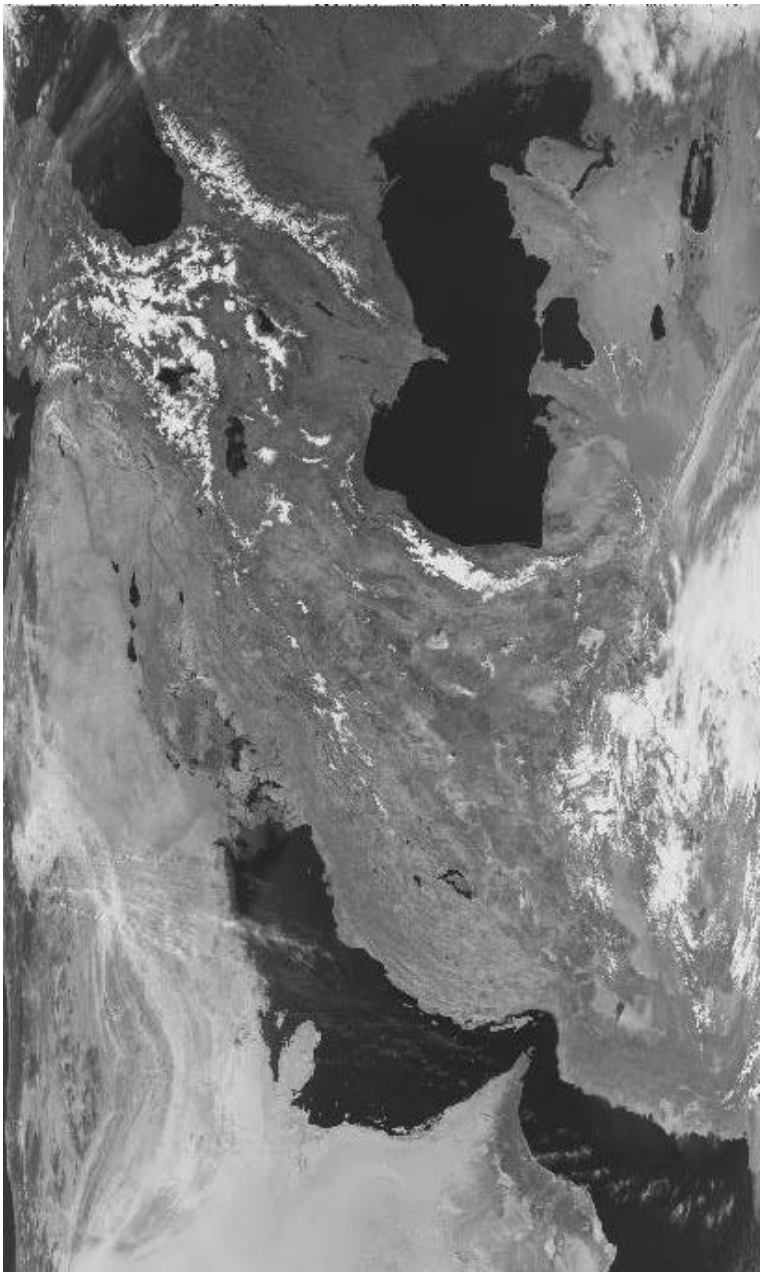

Figure 1. Remote image of Caspian Sea region advanced very high-resolution radiometer (AVHRR) image (Remote Sensing Group, Pacific Northwest National Laboratory)

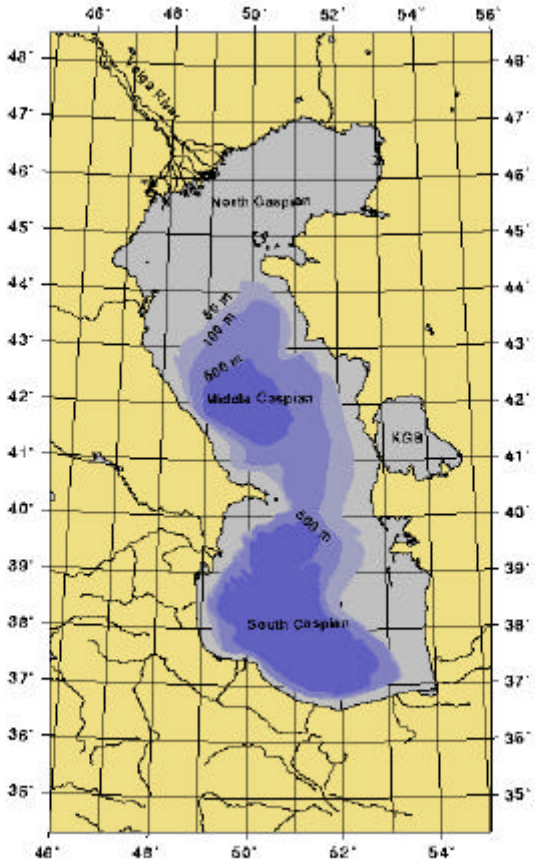

Figure 2. Caspian Sea basins and Kara Bogaz Gol (KBG)

bordered by a narrow coastal lowland strip at the base of the Alborz Mountains (Kaplin 1995). To the west are the Caucasus Mountains, and the Kur-Araks lowlands, much of which are below sea level to the north and south of the range and extending to the sea south of Baku (Figure 4).

Although the Caspian Sea contains over 40% of the world's fresh lake water, surface salinity actually varies between 0 and 1 ppt in the north, near the mouths of the Volga and Ural Rivers, to 12 ppt to 13 ppt in the open part of the middle and southern Caspian Sea (Kaplin 1995) (Figure 6). However, salinity may

Figure 3. Volga River deltra (satellite photograph NM21-704-056, NASA 1998.

reach 200 ppt in some enclosed bays (Karpinsky 1992). Historically, changes in the river outflow from the Volga River, anomalies in wind patterns, and fall of the sea level have resulted in salinity changes in some areas of the Caspian (Tarasov 1998).

Sea surface temperature has a similar north-south asymmetry, due to the latitude difference over the sea (Kaplin 1995) (Figure 7). The northern sea is near 47_N; therefore, with low-salinity water feeding from the Volga and Ural Rivers, annual freezing takes place, and wind-driven rafting of ice can

Figure 4. Map of the Caspian Sea vicinity (mapping software from Wessel and Smith 1991)

produce up to 1 m ice thickness off the Volga delta in the area of the Kulaly Island seal fishery (Bukharitsin 1993). The southern sea remains ice-free below a line between Baku and Krasnovodsk, along latitude 40_N. During the summer, the temperature differential north to south is only 5_C, with

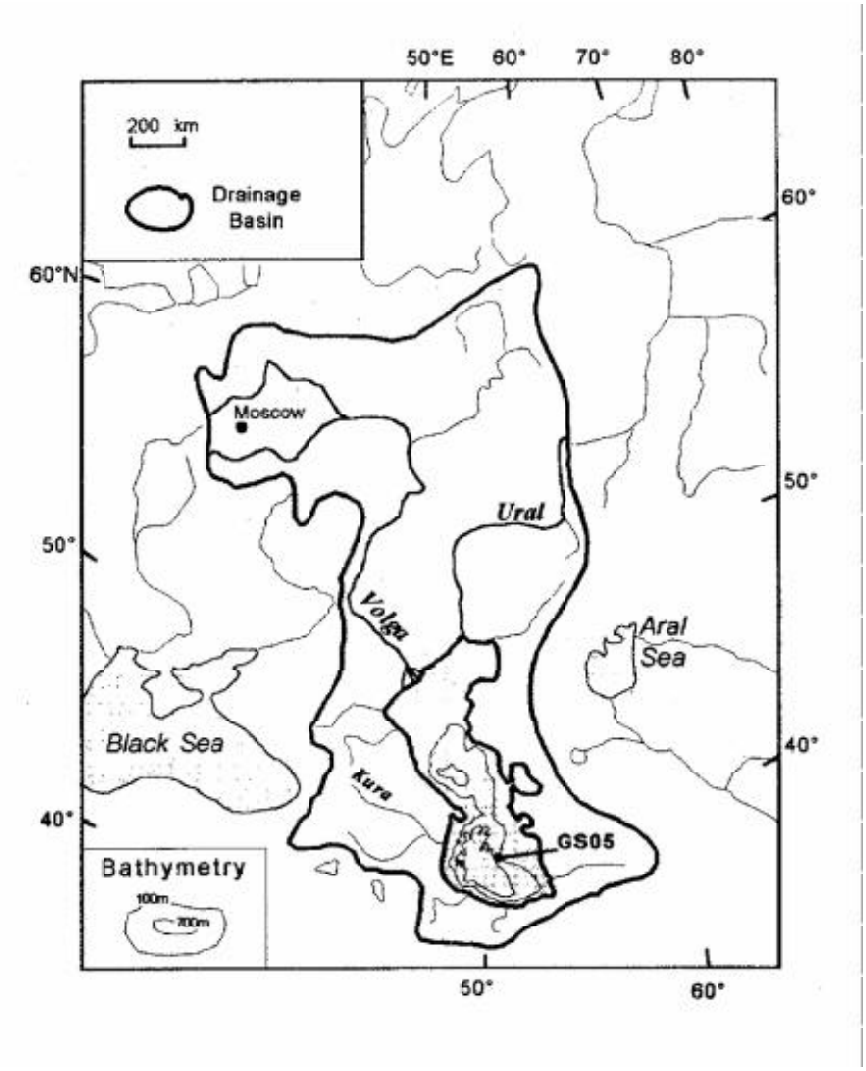

Figure 5. Map of the Caspian Sea catchment areas (After Chalie 1996)

maximum temperatures near 22_C in the north and greater than 27_C in the south (Kaplin 1995).

The thickness of the seasonal thermocline in the Caspian Sea is determined by spring heating and the maximum wind-driven mixing depth. The difference in depth is due to the winter cooling

Characteristic	Quantification
Latitude	36° 33' – 47° 07' N
Longitude	46° 43' – 54° 03' E
Surface Area	378,400 km^2
Volume	78,100 km^3
Length	1030 km
Max. width (45 30 N)	435 km
Min. width (40 30 N)	196 km
Depth in north Caspian (max./mean)	25/4.4 m
Depth in middle Caspian (max./mean)	782/192 m
Depth in south Caspian (max./mean)	1035/342 m
Catchment area, total	3.5×106 km^2
Catchment area of Volga River	1.38×106 km^2
Precipitation, mean (1900-1982)	0.19 m/year
River runoff (1900-1982)	0.77 m/year
Evaporation, mean (1900-1982)	0.97 m/year
Sea level relative to oceans (Jan. 1995)	-25.5 m
Temperature of the surface water, mean annual	13° C
Temperature of the bottom water, mean annual	5.5° C
Salinity	13 ‰
Humidity over the sea, mean annual	80%

a) After Ferronsky et al. (1995).

Table 1. Basic Characteristics of the Caspian Sea.

that can produce convective overturning of the entire water column of the shallower north and central Caspian, but which only influences the top 100 m of the deeper south Caspian Sea. Because of this, bottom water temperatures reach 4.5_C to 5_C in the north and middle Caspian, but only 5_C to 6_C in the south Caspian (Kaplin 1995) (Figure 8).

Regulatory Setting

The main legal issue in the Caspian Sea region rests definitely on whether the body of water is legally recognized as a *sea* or as a *lake*. In the former case, the Geneva Convention on the Sea-Shelf of 1958, and the United Nations Convention on the Law of the Sea (UNCLOS; United Nations 1983) would apply; if it were defined as an inland lake, it would not be covered by these laws. If UNCLOS were applied, the sea would be legally partitioned to national sectors by equidistant division of the sea and undersea resources (Figure 9). Boundary lines would be extended from shore or from a nation's offshore islands an equal distance to the center of the sea. Under the former Soviet Union (FSU) delineation, the sea sectors for Azerbaijan, Turkmenistan, Kazakhstan, and Russia were divided in this way for nearly 20

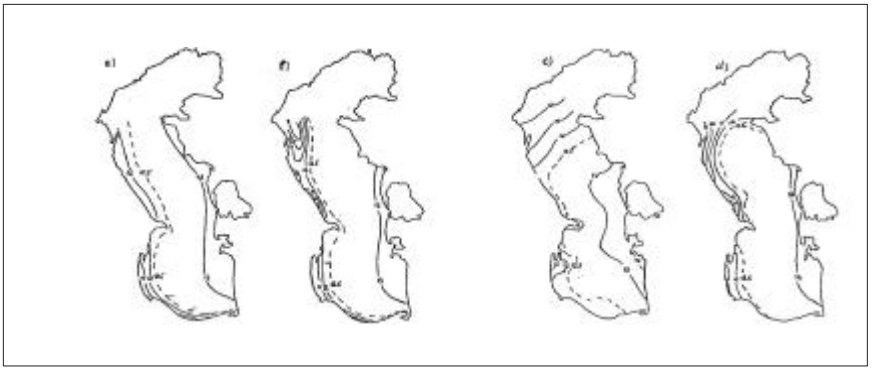

Figure 6. Mean perennial distribution of water temperature on the Caspian Sea surface: a) February; b) April; c) August; d) October (TES 1992, cited in Kaplin 1995)

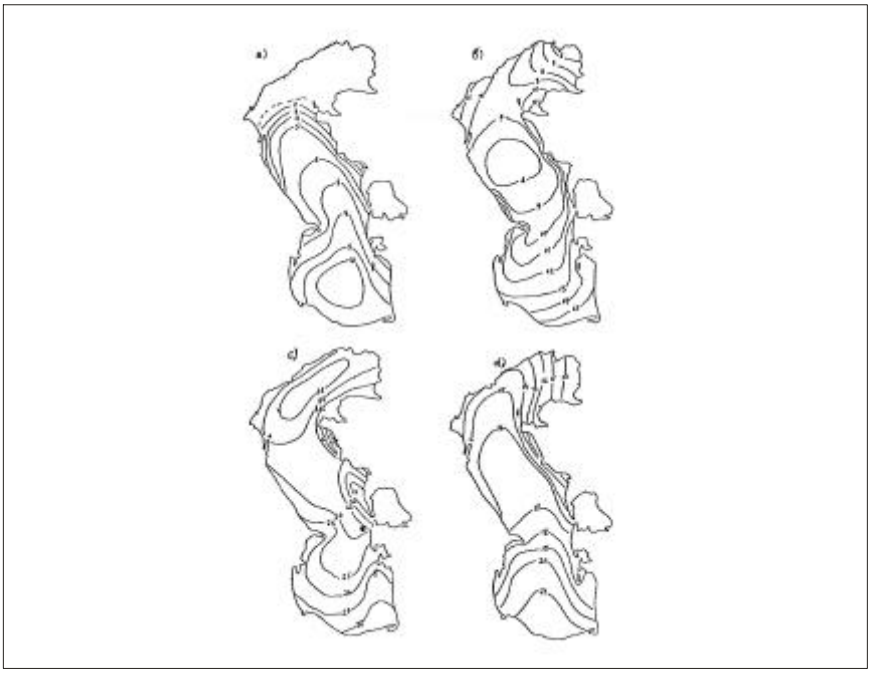

Figure 7. Average perennial distribution of water salinity on the Caspian Sea surface: a) substitute hard space for regular space to keep “a)” and “February” on the same line February; b) April; c) August; d) October (TES 1992, cited in Kaplin 1995)

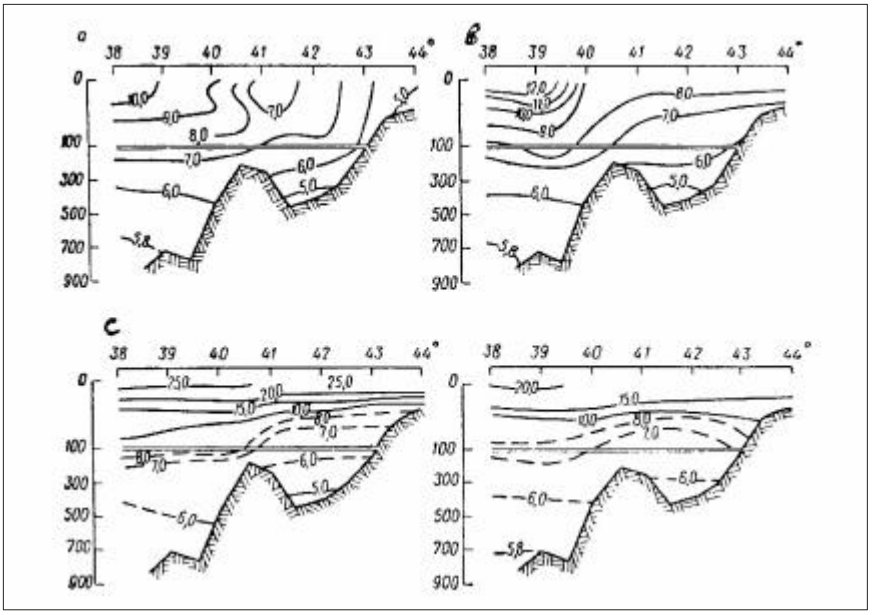

Figure 8. Distribution of water temperature in sea depths meridionally from north to south, 51° E, according to mean perennial data: a) February; b) April; c) August; d) October (Kosarev 1975, cited in Kaplin

years; Iran's Caspian maritime sector was defined by regional treaties with the FSU signed in 1921 and 1940 (EIA 1997c). Of the five littoral states, Azerbaijan and Kazakhstan call for UNCLOS to be applied; Kazakhstan adds that cooperation on the environment, fishing, and navigation would be beneficial.

The Russians argue that the enclosed Caspian Sea, defined as an inland lake, should not be governed by the UNCLOS, but rather, that each nation should have a 45-nautical-mile exclusive economic zone (EEZ), with joint resource development and management in the area beyond the set boundaries. Environmental protection, and resources such as fisheries and oil could be managed or developed jointly outside the EEZs (UNCLOS 1983). A joint corporation of the littoral nations could be formed to exploit the common resources, and all five members would have to approve any offshore oil developments.

Iran backs the Russian claims based on the 1921 and 1940 treaties, which gave fishing rights to Iran and to the FSU within a 10-mile coastal zone (or 12-mile zone, according to Akimov

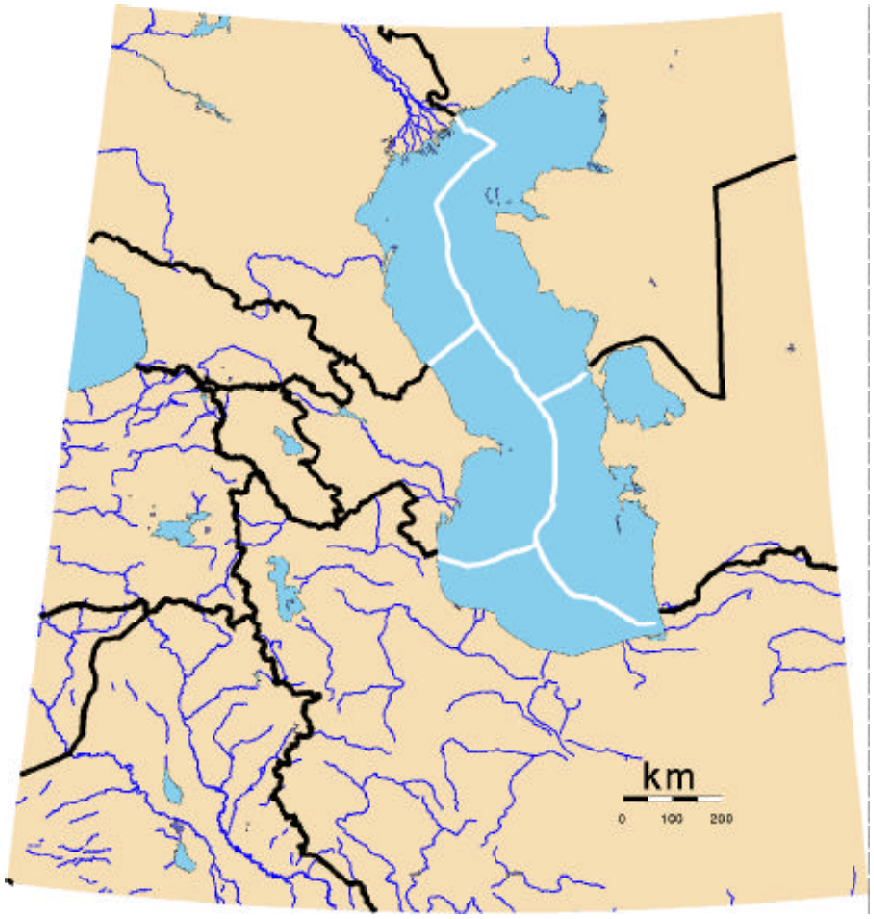

Figure 9. Caspian Sea maritime boundary lines of the five littoral nations. Boundaries are extended from shore or from each nation's offshore islands an equal distance to the center of the sea, drawn as if UNCLOS were applied. Proceeding clockwise from the upper left corner, the countries claiming sections of the sea are as follows: Russia (including the Volga delta); Kazakhstan; Turkmenistan; Iran; Azerbaijan.

[1997]), with shared jurisdiction over the balance of the sea (EIA 1997c). By these agreements, none of the republics of the FSU held individual borders within the sea, because the entire sea was

at that time "federal" property (TED 1997a). These treaties did not establish seabed boundaries, nor did they address oil and gas exploration rights.

Turkmenistan's position has not yet been made clear. In 1996, it initially supported the Russian proposal of a 45-mile exclusive zone for each littoral nation, and signed a protocol with Iran and Russia toward joint development of the energy resources. However, by early 1997, it had revised its position and signed a statement with Kazakhstan calling for the median-type boundaries established by the Soviet administration to be applied until the littoral states could agree on a new status for the Caspian boundaries. However, following a dispute with Azerbaijan over an oil field license, the position was again modified. The most recent presidential statement from Kazakhstan implies the median-line boundary preference; however, a final resolution has not yet been reached (EIA 1997c).

As of October 1997, the U.S. supported in principle that the five littoral states must resolve the legal status of the Caspian Sea, and accordingly, the national boundaries within the sea area. Until mid-May 1998, the U.S. Presidential Executive Order, *the Iran and Libya Sanctions Act of 1996*, required the U.S. to penalize non-U.S. companies that invested over $40 million per year in the oil/gas sectors of those countries. After 1 year, the allowable investment was dropped to $20 million for countries that did not join measures to inhibit Iran's actions that support international terrorism or pursuit of weapons of mass destruction (EIA 1997c). Currently, the U.S. has waived some of the sanctions on companies that deal with Iran, in particular, French, Russian, and Malaysian companies involved in a $2 billion energy deal concerning the Caspian Sea (Jehl 1998; The Washington Post 1998). In July 1997, the U.S. State Department decided that proposed exports of natural gas from Turkmenistan to Turkey via Iran would not violate the law as it stands (EIA 1997c).

According to Dr. K. Yusifzade (1994), vice president for geology and geophysics of the State Oil Company of Azerbaijan Republic, there is a significant difference between fishing and mineral rights in the Caspian Sea. With mineral resources, the seabed rather than the water is the tangible standard: the method of division would follow the UNCLOS sector-division

method. For the fishery, the exclusive-area/joint management rule would apply (Yusifzade 1994).

International Agreements and National Laws/Policies

Azerbaijan

In Azerbaijan, with a coastline of about 800 km[1] on the Caspian Sea (CIA 1997a; ENRIN 1997b), the State committee for the Environment made an effort, particularly between 1990 to 1995, to promote environmental/ecological education in the country, and to involve leading national and international specialists, along with representatives of the interested oil companies, to raise the public awareness of environmental problems of the Caspian Sea and other related issues in Azerbaijan (ENRIN 1997c). It has signed and ratified the United Nations conventions on climate change and ozone layer protection, and signed but not ratified that on biodiversity.

Iran

Iran borders the Caspian Sea for a distance of 740 km (CIA 1997b). It is a party to the following international agreements: endangered species, hazardous wastes, nuclear test ban and nonproliferation treaty, ozone layer protection, wetlands; biodiversity, climate change, desertification, environmental modification, Law of the Sea, and marine life conservation (Farhang va Andisheh Institute 1997). Iran's deputy foreign minister for Euro-American affairs has stressed Iran's policy that the Caspian Sea is a part of the national heritage of all the littoral states, and that although priority has been given to preserving exploitation of oil and gas resources in the sea, preservation of the Caspian environment is of great importance (*Tehran Times*

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1. Of course, the shoreline of each nation cannot be precisely stated; its length depends upon the border determinations, and the level of the sea at any given time. The values shown in the text are taken from current reports, as cited. Kaplin (1995) listed the following: The shoreline is divided among five littoral nations. Beginning at the north end of the sea, and following clockwise, Kazakhstan has the longest shoreline, 2700 km; Turkmenistan has the second longest, 1200 km; Iran has close to 900 km of the southern cost; Azerbaijan claims about 850 km; and the Russian Federation has about 695 km.

December 11, 1995). The state fisheries organizations of Iran, which following the Islamic Revolution (1979) were eventually blended to a single state company called Shirat in the mid-1980s, have established a long-term development plan for development of fisheries and aquaculture, and for promoting the increase of consumption and export of fish by 2020. It considers biological and well as food security issues in its planning (Abbasian 1997).

Kazakhstan

Kazakhstan has at least 1894 km of coastline on the Caspian Sea (CIA 1997c). Since it became independent in 1991, it has become a party to the United Nations agreements on biodiversity, climate change, and ship pollution; it has signed but not ratified an international agreement on desertification. It intends to become a member of the United Nations Development Programme (UNDP) Global Environmental Facility (letter of intent was submitted in 1995) (Zhunusova 1997). Toward this end, representatives of the Ministry of Ecology and Bioresources of the Republic of Kazakhstan attended international meetings, submitted an environmental assessment report in 1996, and participated in preparatory activities through 1995-1997 (ENRIN 1998). In 1997, Kazakhstan's National Environmental Action Plan for Sustainable Development (NEAP/SD) was completed with funding and support from the World Bank; it includes a schedule to prepare national programs and projects to tackle priority environmental issues (Daukeev 1998; Sievers and Aranvaev 1998).

Some doubt is expressed based on the vague wording of laws, limitations on potential lawsuits and on those that can sue for compensation for harm to the environment, and unresolved governmental environmental policies that in spite of official publication and discussion of environmental protection laws in Kazakhstan, there will be little application and enforcement possible, (Kurotov and Svitelman 1997).

Russia

The Russian share of Caspian coastline is nearly 800 km (CIA 1997d). Although it considers the Caspian an inland lake, Russia has international treaties in force that would apply if the Caspian were defined as a sea. Among these are the following: International Convention for the Prevention of Pollution of the Sea by Oil; and the Convention on the Prevention of Marine

Pollution by Dumping of Wastes and Other Matter (London Dumping Convention).

At regional meetings, Russia has expressed priorities of marine environmental preservation and ecosystem management, and a preference for practical regional cooperation programs that are action-oriented. In practice, however, Russia's environmental protection efforts are limited by financial considerations.

Turkmenistan

The Caspian coast of Turkmenistan extends about 1768 km (CIA 1997e). This country is a party to United Nations conventions on biodiversity, climate change, desertification, hazardous wastes, and ozone layer protection.

Conflict and Treaties along Potential Oil Export Routes

In areas of possible oil pipeline routes, there are unresolved conflicts and some attempts at cooperation. The relationship between Russia and Azerbaijan has been strained over alleged arms shipments to Armenia (1993-1995); Armenia and Russia signed a friendship treaty in 1995, along with an agreement for Russia to supply Armenia with natural gas (EIA 1997c). The northern route for Azerbaijani oil passes through Chechnya, where there was nearly 2 years of armed conflict. A peace agreement cleared the path for a three-way cooperative settlement among Azerbaijan, Chechnya, and Russia to allow pipeline repairs and oil export from Azerbaijan, although it did not settle issues of regional security and pipeline tariffs (EIA 1997c).

Cooperation in Caspian Sea Region

Several joint commissions and organizations have been formed to try to encourage a cooperatively controlled development of the region, particularly as it concerns fisheries, oil and gas resources, and cooperation in environmental protection.

One of the most profitable resources of the Caspian Sea is sturgeon, the eggs of which are the luxury food, caviar. Historically, starting in 1917, the Bolsheviks established a state monopoly on caviar; more recently, the two largest exporters of this product, Iran and Russia, formed a joint venture to protect

and conserve the Caspian Sea and its caviar-producing resources (TED 1997b). With the independence of the FSU republics, three additional nations were poised to share the sea's resources. In 1992, the five littoral states signed a memorandum of understanding (MOU) by which an organization was formed for Caspian Sea conservation, essentially to regulate the exploitation of marine resources (TED 1998b). International agreements provide for a total annual harvest of 250,000 metric tons (mt) of fish from the Caspian Sea (Hamlin 1998). This quota must be divided among the five nations sharing the resource, but the nature of the division depends upon resolution of the impasse described above, concerning the nature of the national boundary system (EEZs or median-line) to be exercised in the sea. A permanent international fisheries policy has not yet been established for the Caspian; however, a joint scientific committee has been formed, supported by the United Nations, to consider appropriate management policies (Fish Farming International April 1997).

Law and Environment Eurasia Partnership (LEEP) is a 501(c)93 public charity formed under the auspices of and directed by six grassroots, nonprofit, nongovernmental organizations (NGOs) in Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan), the goals of which are to improve existing environmental and nonprofit legislation in Central Asia, to develop conservation projects, to provide information to local NGOs, and to encourage Western support for civil society in the region.

In 1991, a conference on the *Creation of the Committee of the Caspian Countries to Solve the Problems of the Caspian Sea* was held in the Islamic Republic of Iran, attended by the Azerbaijani State Committee for the Environment, among others. The *First Baku International Conference on the Problems of the Caspian Sea* was attended by representatives of 158 countries. According to some sources, no outstanding result was achieved (Payam-e Darya 1995). Two years later, at a meeting in Tehran in 1994, a cooperation program was drafted and approved by representatives of all Caspian states, aided by various United Nations and World Bank participants, and committees were formed to consider problems of environmental protection, sea level change assessment, marine transportation, legal matters,

and Caspian Sea research (Payam-e Darya 1995; ENRIN 1997a, 1997b). This organization has also not yet achieved its objectives.

In 1992, a large group of experts in the Russian Federation published a technical and economic study on the Caspian Sea, in large part, encourage cooperation of the littoral states in protecting the coast against possible encroachment of the sea, and on other ecological problems and conditions for the economic development of the region (TES 1992).

In 1995, representatives from the five littoral states established the *Caspian Sea Initiative* in collaboration with coastal governments, private sector, UNDP, United Nations Environmental Programme (UNEP), and NGOs to coordinate environmental protection and management of the Caspian, supported by a World Bank-executed grant of $US500,000 from Japan (World Bank 1997a, 1997b).

The Presidium of the Azerbaijan Academy of Sciences formed an international center, located in Baku for the ecological investigation of the Caspian Sea, and for cooperation between Soviet and foreign scientists. This cooperative effort focuses on a) toxic substances in the sea and its river sources; b) the ecology of invertebrates, commercial fishes, and rare/disappearing species of the Caspian ecosystem; and c) on creating an environmental monitoring system.

The World Bank has supported efforts to tackle the environmental issues of Central Asia by helping governments to develop NEAPs, which emphasize sustainable policy changes and further institution building. In fiscal 1997, the NEAP for Kazakhstan was completed; those for Armenia, Azerbaijan, Georgia, and Uzbekistan will be completed in fiscal 1998. The World Bank also continues its support of international programs to clean up the Caspian Sea (World Bank 1997a, 1997b).

There is a pilot program through the U.S. G-7 Global Inventory Project proposed as an entrepreneurial initiative, led by Technical Entrepreneurs Intrapreneurs Network (TEIN) to encourage the economic development and environmental protection/cleanup of the Caspian Sea. This project aspires to work with governments, educational and research institutions, and businesses in the littoral states (including Iran, when U.S. foreign policy permits), to initiate environmental protection and remediation projects, aquaculture, infrastructure development,

oilfield services, telecommunications, and tourism, all with an emphasis on joint ventures with regional entrepreneurs (Dey 1997).

In the arena of gas and oil development, there are many consortia, partnerships, and agreements among oil companies and governments of the nations surrounding the Caspian Sea, including those that do not actually have coastline on the sea, but which are involved in potential transport by pipeline or other related issues. For example, in 1994, a consortium of oil companies led by British Petroleum signed a contract with Azerbaijan to invest $8 billion over 30 years to develop oil resources and transportation by one of three possible routes (TED 1998a). Kazakhstan and China forged a contract for the latter country's investment in development of Uzen field development, and construction of an oil pipeline to China (Kasenova 1998). In 1997, the State Oil Company of Azerbaijan Republic (SOCAR) signed a production-sharing agreement with Mobil Oil for a particular block of seabed off the coast of Azerbaijan, which gives Mobil a 50% working interest in the block. The importance of such an agreement is indicated by the presence of Vice President Al Gore, Secretary of State Madeleine Albright, and Azerbaijan President Heydar Aliyev at the signing ceremony in the White House (Slater 1997). Other agreements are discussed in the section on oil/gas baseline.

Caspian Sea Level

The Caspian Sea level has changed significantly in the past. The factors responsible for the variation are theorized to be *climatic*, such as atmospheric variations, *anthropogenic,* which have affected river discharges, especially that of the Volga River, and *geologic,* such as subsidence and neotectonic movements. The relative importance of these as they affect the Caspian Sea level is continually debated and not easily resolved. Climate, geology, and human influences are likely to be interlinked. Because there is no outlet from the Caspian Sea, it is widely accepted that the Caspian Sea level variations are related to variations in atmospheric forcing (i.e., net evaporation). The long-term trends in the Caspian Sea level, runoff, precipitation, and temperature are shown in Figure 10.

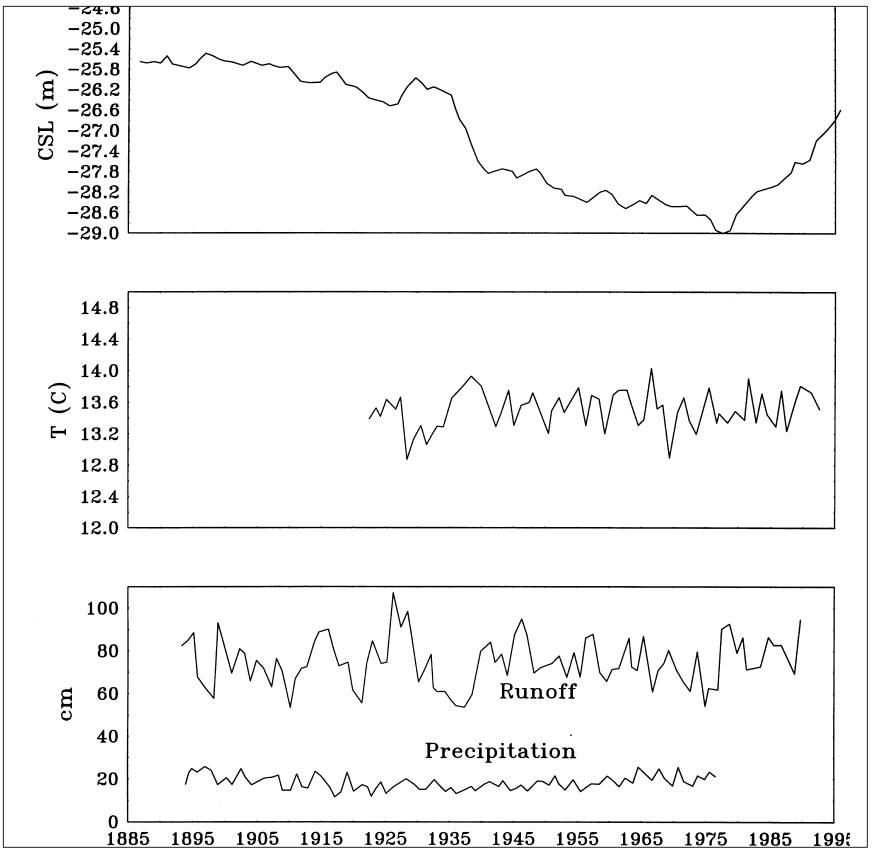

Figure 10. Time series of annual Caspian Sea level, runoff, precipitation, and temperature (after Ferronsky et al. 1995)

Tectonics

Shilo (1990) theorized that the degree to which runoff variation has led to variations in the Caspian Sea level has been overestimated, and that neotectonics and the resulting groundwater flow variations are more likely causes in Caspian Sea level variations.

Wind

Golitsyn et al. (1990) attributed the post-1977 rise in the Caspian Sea level to increased river discharge, decreased net evaporation, and to the blocking off of Kara Bogaz Gol Gulf. The important factors are the increased precipitation in the Volga

watershed and over the Caspian Sea itself. Through statistical analyses, it was determined that the only factor that affects evaporation and that had significant variation was wind speed. No significant trends were found for air or sea temperature, or for humidity. Winds were found to have decreased between 1960 and 1987. Decrease in wind speeds infers that a reduction in evaporation led to a Caspian Sea level rise. The wind trends are associated with large-scale fluctuations in atmospheric circulation.

Estimating Evaporation

Lobanov (1987, 1990) discussed the methods used to estimate Caspian Sea evaporation levels. The earliest estimate of evaporation on this sea was 1.085 m/year; this was accomplished by balancing precipitation and river runoff. Physically based estimates using wind speed and vapor pressure gradients yield values very close to the earliest estimated value above. Neither accounts for the possibility of groundwater sources or sinks; both are subject to uncertainty in precipitation levels. More highly parameterized evaporation rate formulation yields reduced evaporation estimates of 85 cm/year. More detailed and varied estimates yield similar values, ranging from 85 cm/year to 111 cm/year. The error of these estimates is stated be 15%. These formulations take into account the vapor content (humidity) of the overlying air of the Caspian Sea. Global climate change can affect the vapor content. Therefore, these formulations and their incorporation of humidity can be used to estimate the effect of global climate change on evaporation, and accordingly, also on the Caspian Sea level.

Panin et al. (1991) discussed their statistical analyses of the wind over the Caspian Sea and its relevance to the evaporation estimates. They statistically quantified the relationship between wind speed's downward trends and evaporation.

Forecasting

Meshkani and Meshkani (1997) applied a stochastic model to attempt to explain the trends in the Caspian Sea level and its fluctuations. They attempted to relate the present and past levels of the sea, of precipitation, and of temperatures. The goal of their

research is to provide 5-year forecasts for the Caspian Sea level. *Their model indicates a continued rise in the Caspian Sea level.*

Vaziri (1997) developed stochastic models of the Caspian Sea level. Unlike the Meshkani and Meshkani (1997) work, the models developed by Varizi use only past Caspian Sea levels as inputs. Varizi's model was validated for making short-term (month to year) Caspian Sea level estimates. The models were accurate to +/-3 cm and were determined to be useful in planning.

Economics

Shayegan and Badakhshan (1996) discussed the causes of the recent (decadal) rise in the Caspian Sea and its economic effect on the coast of Iran. The possible causes of the Caspian Sea level fluctuations include the following:

- changes in hydrology
- water withdrawals from the Caspian Sea for agricultural and industrial uses
- tectonic movements
- climate changes
- inhibited evaporation from Caspian Sea due to oil pollution
- diversion of water from outside of the Caspian Sea watershed
- the greenhouse effect and melting of polar ice
- subsurface communication between Caspian Sea, the Black Sea, and the Aral Sea.

Neither the significance nor the relative magnitude of influence of each of these potential causes of Caspian Sea level rise was not offered by Shayegan and Badakhshan in their analysis.

Paleogeography and Radiodating

Rychagov (1997) reconstructed the Caspian Sea level based on paleogeographical analysis. The effect of neotectonics,

sedimentation, and anthropogenic factors on river discharge cannot explain the Caspian Sea level fluctuations. It was concluded that climatic factors are the most likely cause of the Caspian Sea level fluctuations. Detailed analysis was offered of the geology and geomorphology of the Caspian Sea coastal zone, especially at the river mouths. Radiocarbon dating of marine shells was used to reconstruct that Caspian Sea level for the last 10,000 years. In contrast to the results of Meshkani and Meshkani's (1997) forecast, these analyses indicated that the present rate of Caspian Sea level rise should decrease, and that the present Caspian Sea level is within the expected range given the reconstructed 10,000 year historical levels.

Ferronsky et al. (1995) used isotopic analyses (oxygen) and salinity measurements of river and Caspian Sea water to aid in quantificating of the mixing of these two waters. Their analyses indicate that the Caspian Sea is divided into three zones: north, middle, and south. Each of these zones contains a different mix of river runoff, as indicated by the salinity and oxygen distributions (Figure 11). The degree of vertical mixing in the middle and southern zone was investigated by measuring tritium profiles. Through these analyses, Ferronsky et al. theorized that the increase river runoff, with its temperature lower than that of the Caspian, has led to reduced evaporation. The tritium analyses indicated that during the 1990s complete vertical mixing was established, which should lead to stable density profiles. This is turn should lead to a warmer surface layer and increased evaporation; increased evaporation could then lead to a drop in Caspian Sea level.

Remote Sensing

Cazecave et al. (1997) reported on the usage of TOPEX/POSEIDON imagery for assessing the Caspian Sea level. They reported that the Caspian Sea level was decreasing by mid-1995 and continuing to decrease in 1996 at a rate of 25 cm/year, whereas it had been increasing during the previous periods at rate of 19 cm/year. Use of the synoptic observations allowed Cazecave et al. to show that the Caspian Sea level fluctuations were not spatially uniform. The rate of the Caspian Sea level rise in the north was 3 cm/year greater than it was in the south.

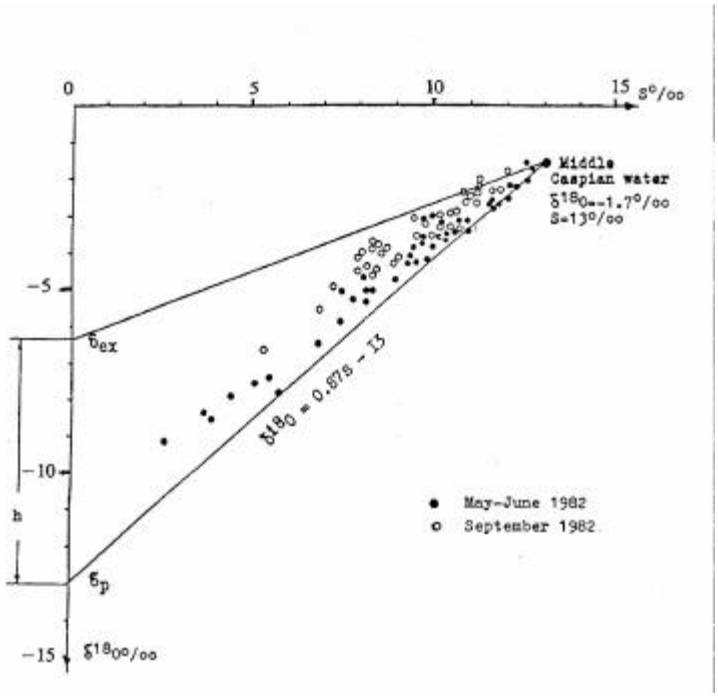

Figure 11. Diagram of 0-18 and salinity for north Caspian Sea in 1982 (after Ferronsky et al. 1995)

Hydrologic Balance

Hydrologic balance models have been used to investigate the relative magnitudes of the sources and sink of water within the Caspian Sea (Rodionov 1994). Rodionov (1994) concluded that alteration of the flow due to human activity from the Volga to the Caspian is a secondary but significant factor relating to long-term, nonseasonal variations of the Caspian Sea level, but can be contributing up to 70% of the seasonal Caspian Sea level. *Sources* of water include runoff (R), precipitation (P), and groundwater flow (G); *sink* include evaporation (E), and discharge of water through the Kara Bogaz Gol Gulf. The balance of the quantities leads to a Caspian Sea level change (_L). When these quantities are expressed in centimeters, the values are as follows:

R = 77 cm; P = 19 cm; G = 1 to 18 cm; E = 97 cm; and Kara Bogaz Gol = 3 cm.

Golitsyn (1995) broke down the components of the hydrologic budget in terms of annual contributions to change in Caspian Sea level: runoff (+75 cm), precipitation (+20 cm), evaporation (-96 cm), Kara Bogaz Gol (-1.5 cm). River withdrawals are shown to have effectively reduced the annual rate of Caspian Sea level rise by (-11 cm). The system of reservoirs on the Volga has matured to the point that its effect on the Caspian Sea level has stabilized. Seasonal variations in the Caspian Sea level are on the order of 40 cm within each year. Golitsyn discounted both the paleoreconstruction of the Caspian Sea level levels and the assertion that neotectonics plays a role in Caspian Sea level fluctuations. It was suggested that watershed analyses (snow depth) would be a significant parameter for estimated near-future (within a year) Caspian Sea level levels. The Caspian Sea level is presently forecasted using Volga watershed snow level for periods up to 1 year, with accuracy of about 5 cm. Golitsyn also suggested that analysis of long tidal record is cumbersome, and that satellite images (TOPEX/POSEIDON, for example) is a more ideal way to analyze Caspian Sea level data. Using stochastic modeling for Caspian Sea level forecasting is discounted, because much of this type of modeling is theoretical, bound by the assumption that the process (Caspian Sea level variation) is stationary, that is, that long-term trends have been removed. Because this stationary assumption is violated, stochastic model forecasts, such as that of Meshkani and Meshkani (1997), are called into question.

Erosion Related to Caspian Sea Level Rise

Ignatov et al. (1993) discussed the role of Caspian Sea level rise on the rate of coastal erosion. In the Caspian, the effects of sea level rise and the changing sediment loads from river sources have complicated the analysis. The system of dams on the rivers leading to the Caspian Sea has significantly reduced the sediment load. The Caspian Sea level rise has led to further erosion of river deltas. The effect of the Caspian Sea level rise is discussed and categorized according the bed slope of the coastal regions along the shore of the Caspian Sea.

Klige and Myagkov (1992) stated that 78% of the water input to the Caspian is from runoff from 130 rivers; 20% is from direct precipitation; and the balance of input is from groundwater contributions. Most of the water loss (97%) from the Caspian Sea is from evaporation, and the remaining 3% goes to discharge into

the Kara Bogaz Gol Gulf. Historically, changes in the water budget are attributed to large-scale nonanthropogenic climatic changes leading to fluctuations in runoff and evaporation. However, they concluded that global warming, whether natural or anthropogenically triggered, will effect the Caspian Sea level to a degree that is comparable to those seen historically.

River Inputs

The Volga River is the source of 78% of the riverine input into the Caspian Sea; there are many other minor rivers that flow into the Caspian.

Consequences of Caspian Sea Level Rise

The rise of the Caspian Sea level in 1977 has led to the inundation of coastal regions that had been built upon during the period from 1927 to 1977 (a falling Caspian Sea level period). This has had obvious negative impacts on the coastal development, as alluded to by many authors (Shilo 1990; Meshkani and Meshkani 1997; Vaziri 1997; Cazenave et al. 1997). The inundation of the coastal regions has had an impact on transportation, industry, and tourism to the Caspian Sea coastal region (Shayegan and Badakhshan 1996).

Shayegan and Badakhshan (1996) indicated that the devastating effect (within Iran) of the Caspian Sea level rise did not occur until 1986. They described three categories of losses: a) financial, b) land and agricultural, and c) human and physiological. The quantification of the first two types of losses is relatively well documented; however, it has been difficult to quantify the human and physiological effects.

Financial losses include the 10,000 homes that have been damaged or destroyed, infrastructure losses (including water and power installations, port facilities, and fisheries institutions). The total financial losses were estimated to be 1500 billion rials (about $US1 billion). The construction housing and institutions, and the installation of water barriers is estimated to cost about 30 billion rials (about $US2 billion).

The land and agricultural losses amount to 20,000 ha of land, damaging wells, orchards, and fisheries, and causing infrastructure losses. Soil salinization is among the negative impacts of flooding related to Caspian Sea level rise (Kaplin 1995).

A positive impact has been expressed for fisheries, probably due to increased freshwater flow into the Caspian Sea and the consequent increased area of suitable spawning grounds (Kaplin 1995). Nonetheless, the quality of fresh water introduced into the Caspian Sea is noted to be poor, due to the discharge of sewage containing petroleum, phenols, copper, zinc and pesticides. Whether the Caspian Sea level rise has had an effect on the damage due to contaminant-loading is not documented. Kaplin (1995) stated that if the Caspian Sea level were to rise to –25 m, the loss of land within Russia would be 600,000 ha, and the loss of land within Kazakhstan would be 800,000 ha. Damage to oil and gas facilities that were not designed to be inundated is noted to be a significant negative impact to Caspian Sea level rise. Other industries that are negatively affected by Caspian Sea level rise include salt mining, transportation, tourism, and recreation. A cascade of other industries, such as the timber industry, are negatively affected by a disruption in the transportation facilities. Improved regulation of the dam that separates Kara Bogaz Gol Gulf from the rest of the sea has been suggested as a mitigation of the Caspian Sea level fluctuation in the future (Rychaogov 1997).

Water Quality

Overview

The most technologically developed areas of the Caspian Sea region, including Central Russia, the Urals, Azerbaijan, Kazakhstan, and Turkmenistan, have had the greatest impact on the water quality of the sea (Efendieva and Dzhafarov 1993). Anthropogenic effects are evident in the river deltas and in ecologically sensitive areas of the sea, including the Kara Bogaz Gol Gulf (Figure 12), Baku Bay, and the coastal waters near Sumgait (Efendieva and Dzhafarov 1993). Increased urbanization, industrialization, and harvesting of natural resources have led to particularly heavy impacts in the northern region of the Caspian Sea (Efendieva and Dzhafarov 1993). Based on hydrochemical measurements, the Northern Caspian sea is classified as moderately polluted and the waters near the Ural Borozdina are polluted (Bukharitsin and Luneva 1994).

Figure 12. Kara Bogaz Gol Gulf (satellite photograph NM21-724-027, NASA 1998)

Land-Based Pollution Sources

The major land-based sources of pollution to the Caspian Sea enter the sea via industrial and domestic wastewater (Efendieva and Dzhafarov 1993). The chemical industry of the Caspian includes a major complex in Azerbaijan, gas and gas-condensing plants in Astrakhan, the petroleum- and-gas works in Kazakhstan, and the salt-mining industry in the Kara Bogaz Gol Gulf (Kaplin 1995). Waste water entering the sea includes warm water from power stations (such as the nuclear reactor at Aqtau), water from desalinating facilities, treated and untreated water from domestic and industrial factories, contaminated sludge, and runoff from industry and agriculture, including animal wastes.

Inappropriate use of land-based fertilizers, pesticides, and herbicides has likely led to contamination of food and water supply and to human exposures. Genetic mutation and cancers are among the resulting ecosystem and human health concerns. The need for wood as fuel has resulted in soil erosion and associated water pollution.

Offshore Pollution Sources

Leakage of oil from offshore oil production is a major source of Caspian Sea pollution (Karpinsky 1992). In some areas, oil sheens have covered the sea surface (Figure 13), and lumps of oil were present on the bottom sediments near the Apsheron Peninsula (Baku) and on the western side of the southern Caspian.

Figure 13. A large oil slick in the western Caspian offshore Baku, near some offshore platforms. The source of the spill is unknown, but the slick is one of the largest ever photographed from space (satellite photograph NM21-773-060A, NASA 1998)

Water Supply

The rise in sea level can result in salt water entering the water table. In general, domestic water delivery systems are unreliable and poorly maintained, and often include rusty pipes and reservoirs of disease vectors. Because landfills are generally unregulated and poorly maintained, leachates can enter the groundwater. Many wastewater treatment plants are outdated and inadequate.

Radionuclide Contamination

The inundation resulting from sea level rise may cause washout of residual radionuclide contamination in regions where Soviet underground peaceful nuclear explosions (PNEs) took place. In addition, there could be potential for leakage from sites of past uranium mining and milling, nuclear waste dump- and burial sites, and reactor operations in the region.

Russia and Kazakhstan

Wastewater entering the Volga River contains pollutants such as heavy metals, pesticides, oil, surfactants, and phenols. More than 23 km^3 of wastewater and industrial wastes

Pollutant	1986	1987	1988	1989	1990	units
Petroleum products	94	124	158	62	146	Thousand mt
Phenols	635	1150	158	62	146	mt
Active surface subst.	3000	2900	2800	2790	3420	mt
Suspended particles	NA[b]	NA	17.62	NA	17.62	mt
Pesticides	74	0.96	0.78	1.51	30.5	mt
Copper	2700	1200	1060	863	11	mt
Zinc	NA	NA	NA	NA	1630	mt

a.) TES 1992, cited in Kaplin 1995. b) NA Not available.

Table 2. Discharge of Pollutants to the Caspian by the Volga Runoff[a].

containing 387,000 mt of suspended solids enters the Volga River per year (Bukharitsin and Luneva 1994; Kaplin 1995) (Table 2). The Volga received 600 mt of pesticides and 300 Mmt of solid wastes in 1992 (Efendieva and Dzhafarov 1993). Approximately 120 Mm^3 of sewage enters the Volga each year, 85% of which comes from agriculture and processing activities (Kaplin 1995). The anthropogenic load from the Astrakhan region is high on the Pyramaya Bolda Arm of the Volga (Bukharitsin and Luneva 1994).

Recent increases in high-tonnage shipping and the creation of port facilities have added to the pollution load of major Russian rivers. Industrial discharge from Volgograd contains petroleum, sulfate, and phenol wastes, and area agriculture has used 100 types of pesticides, including DDT and hexochlorane (Voropaev et al. 1992). Synthetic surfactants enter the waste stream from industrial, domestic, and agricultural wastewater, and from cleaning oil transport vessels. The highest surfactant concentrations (0.11mg l-1) have been observed near the mouth of the Volga River (Bukharitsin and Luneva 1994). Bukharitsin and Luneva (1994) classified the water of the lower Volga as moderately polluted, polluted, or extremely polluted (Table 3).

In 1996, changes were observed in the morphology of juvenile frogs collected near a chemical weapons factory and a chemical fertilizer factory on the middle Volga (Chubinishvili 1996). The highest incidence of developmental abnormalities occurred in frogs collected at the site of the wastewater discharge from the chemical fertilizer manufacturing plant.

A toxicological study used water samples collected near municipal and industrial wastewater discharge sites on the Volga for acute and chronic laboratory toxicity test using guppies and daphnia (Flerov et al. 1996). The water collected from a residential area discharge site was acutely toxic year-round, requiring as much as a tenfold dilution to stop the acute toxicity. The water from an industrial site was acutely toxic for 9 months of the year, requiring as much as a hundredfold dilution to eliminate the acute toxicity. These studies stress the need to modernize private and public wastewater treatment plants to handle the increasing volume of waste.

Index	MPC[b] mg/L	High Pollution		Extremely High Pollution	
		Mg/L	MPC	Mg/L	MPC
Oil products	0.05	1.05	30	5.00	100
Phenols	0.001	0.030	30	0.100	100
Synthetic surfactants	0.1	1.00	10	10.00	100
Ammonium nitrogen	0.39	3.90	10	NA[c]	NA
Nitrite nitrogen	0.02	0.20	10	NA	NA
Nitrate nitrogen	9.10	91.0	10	NA	NA
DO[d]	NA	3.0	NA	2.0	NA
BOD[e]	3.0	15.0	5	60.0	20

a) Bukharitsin and Luneva 1994.

b) MPC Maximum permissible concentration.

c) NA Not available.

d) DO Dissolved oxygen.

e) BOD Biological oxygen demand.

Table 3. Characteristics of Surface and Sea Water Quality[a]

Northern Caspian

The anthropogenic load from the Astrakhan region is high on the Pyramaya Bolda Arm of the Volga. The waters of the northern Caspian are classified as moderately polluted, and those near the Ural Borozdina, as polluted (Bukharitsin and Luneva 1994).

Nonetheless, the pollution of the surface waters has been steadily decreasing for most pollutants in recent years, with the exception of nitrogen and phosphorous, which have increased significantly (Figure 14).

The average annual oil pollution in the northern Caspian seawater increased from 0.007 to 0.21mg l-1 from 1985 to 1990 (Bukharitsin and Luneva 1994). Maximum pollution was

detected from the Mangyshlak Ledge and in the sea near the mouth of the Volga River. Bukharitsin and Luneva (1994) concluded that nearshore petroleum industry increases water pollution and degrades the ecosystem, and that it is aggravated by sea-level rise often accompanied by wind-surges, especially in the northeastern part of the sea. The authors projected severe negative impacts from further development of the oil industry in the northern Caspian area. In addition to oil production and transportation, natural oil seeps from mud volcanoes on the sea floor contribute to the levels of oil found in the water and the seabed of the Caspian (Ireland 1994).

The Volga and the Ural Rivers (Kaplin 1995) carry large amounts of plant nutrients into the Northern Caspian. The

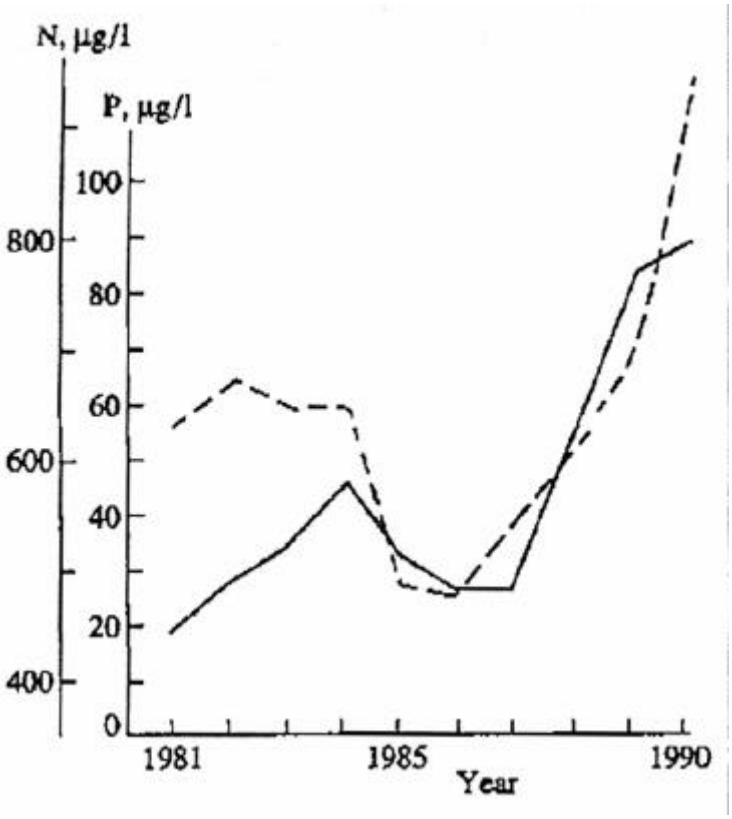

Figure 14. Dynamics of phosphorus concentration (solid line) and mineral nitrogen (dashed line) in Volga River water (Bukharitsin and Luneva 1994)

wastewater entering the Volga contains nitrogen and phosphorous compounds; these organics contribute an anthropogenic portion that can be 70% of the total load (Bukharitsin and Luneva 1994). The organic matter input to the northern Caspian increased from 3.5 to 6-7 million mt since the early 1980s. The concentration of ammonium nitrogen in the lower Volga increased to 204 mg/L in 1990 (Figure 14). The concentration of phosphorous in the northern Caspian is similar to those found in the Volga River discharge waters. Nitrates and nitrites are in greater concentration near the river discharges in the western sea than in discharges from the east. The amount of total nitrogen in the northern waters has increased steadily since 1970 due to the input of organic nitrogen into the sea. This input has resulted in increased eutrophication in Volga delta and northern Caspian waters.

The oxygen levels in the northern Caspian Sea area during the late 1980s were considered reasonable and averaged 10mg/L from 1987 through 1990 (Bukharitsin and Luneva 1994). However, with the recent rise of the Caspian Sea level, an increasing amount of organic matter is entering the sea from the Volga River delta. Large areas of oxygen depletion occur that are two times larger than before the Volga waterway was altered in the late 1950s and penetrate to depths of 10 m. The change in oxygen levels affects the ecosystems and can be observed by changes in the frequency and duration of algal blooms, benthic dieoffs, fish kills, and changes in fish distribution.

The dissolved oxygen content of the seawater is a significant indicator of hydrochemical conditions (Kaplin 1995). The dams on the Kura and the Volga diminish flows and create areas below the hydrostations with increased temperatures and low dissolved oxygen (Efendieva and Dzhafarov 1993). In the Northern Caspian, oxygen levels range from 4.9 to 10.6 mL/L. The oxygen content in the seawater below 400m is 1 mL/L higher than in the waters above 400 m. The mixing caused by the inflow of Volga River waters can increase the dissolved oxygen from 1% to 9%, but the dams and irrigation have significantly diminished the water flowing into the sea.

The pH levels of the Caspian sea are generally higher than those of other marine basins, due to the alkaline river inflows they average 8.3 to 8.6 in the surface layer and 7.8 to 8.0 in the deep layer. The pH of the surface waters has been increasing in

the last several decades, indicating increased photosynthesis. Following the increased river input and the rising sea level since the late 1970s, the trend in water conditions has been generally favorable ecologically; salinity is down, and inorganic phosphorous has increased, whereas silicon content is down, indicating increased phytoplankton biomass.

Heavy metals can be the most hazardous pollutants due to their persistence and biaccumulation in the ecosystem (Bukharitsin and Luneva 1994). The metal pollutants are suspended in the waters of the Volga River delta in various forms, organic or inorganic, and hydrological processes govern their associated toxicity. Field studies conducted from 1985 to 1990 found considerable water pollution and zinc and copper exceeded maximum allowable limits at many northern Caspian Sea sites. The major sources of copper and zinc pollution in northern Caspian and the Volga delta area are industrial and agricultural wastewater. The copper in the Volga River water increased 11.5 times, zinc 9.8 times (22.5 _L/L), lead 5.6 times (1.3 _L/L), cadmium 4.9 times (0.5 _L/L) after the late 1980s.

In riverbed sediments from the Volga delta, concentrations of metals decreased from 1982 to 1988. Iron, manganese, nickel, copper, and vanadium decreased by 1.4, 1.5, 1.7, 1.8, 2.4, and 3.8 times respectively (Mumzhu et al. 1991).

Azerbaijan

The main sources of water contamination in Azerbaijan are industry, agriculture, cities, energy production, and recreation. Azerbaijan discharged more than 300 million m^3 of treated wastewater and more than 500 million m^3 of polluted wastewater into the Caspian Sea in 1992. This wastewater included more than 3000 mt of petroleum products, 28,000 mt of suspended substances, 74,000 mt of sulfates, 315,000 mt of chlorides, 25 mt of phenols (Efendieva and Dzhafarov 1993). Azerbaijan has an aging urban infrastructure with unreliable power, water, and sewage services. Extensive coastal flooding is occurring due to sea level rise (Bickham 1996).

Local Azerbaijani scientists described the Aspheron Peninsula and the Caspian Sea as the “ecologically most devastated area in the world because of severe air, water, and soil pollution” (CIA 1997a; EIA 1997a). The water supply in Baku is

unreliable, with problems such as turbidity, higher organics and bacteria content, 50%-60% loss to leaks in the system, and outbreaks of cholera and hepatitis (Blair 1994).

The area surrounding Baku is littered with old wooden derricks surrounded by pools of oil left as a result of poor extraction techniques and lack of maintenance; these are slowly being swallowed by the rising sea (Dumont 1995). Large, lifeless areas of the seabed, called "dead zones," are alleged to be present in the coastal waters near Baku Bay and Sumgait (Figure 15) (Rowe 1996). In Baku Bay, the bottom sediments are contaminated with approximately 200 million mt of petroleum hydrocarbons, phenols, heavy metals, alkalis, and other toxic substances to a depth of 10 m to 12 m (Efendieva and Dzhafarov 1993). Total hydrocarbon polycyclic aromatic hydrocarbons (PAHs), known carcinogens, were found in the harbor sediments approximately 10 times above the maximum values reported in the U.S. status and trends data (Figure 16) (Rowe 1996). Forty percent mortality was observed in larval and fingerling sturgeon (*Acipenser gueldenstaedti*) exposed to 2.4 ppt of sediment collected from Baku harbor (Figure 17) (Bickham 1996). Further, survivors of the sediment-exposure test revealed increased chromosomal breakage in their blood cells, which could affect the health and condition of the sturgeon and reduce their reproductive potential (Bickham 1996).

Although wastewater treatment plants in Azerbaijan were upgraded in the early 1990s, they have not been able to keep up with increasing demands. Baku Bay has received as much as 800 million m^3/year of industrial and domestic wastewater, and the dead zone in Baku Bay inhibits natural remediation of pollutants (Efendieva and Dzhafarov 1993; Bickham 1996).

Historically, Sumgait contained as much as 80% of the industrial chemical manufacturing capacity of the FSU (Bickham 1996).[2] Although the industry operated at 15% of its capacity in

2. Although a direct link between the environmental pollution has not been demonstrated in the city of Sumgait on the Aspheron peninsula in Azerbaijan, cemeteries with hundreds of children's graves usually marked by portraits of deformity and retardation, high rates of miscarriages, still births, birth defects, and mortality during the first year of life are reported by the ecological advisor to Sumgait's Mayor (Islamzade 1994).

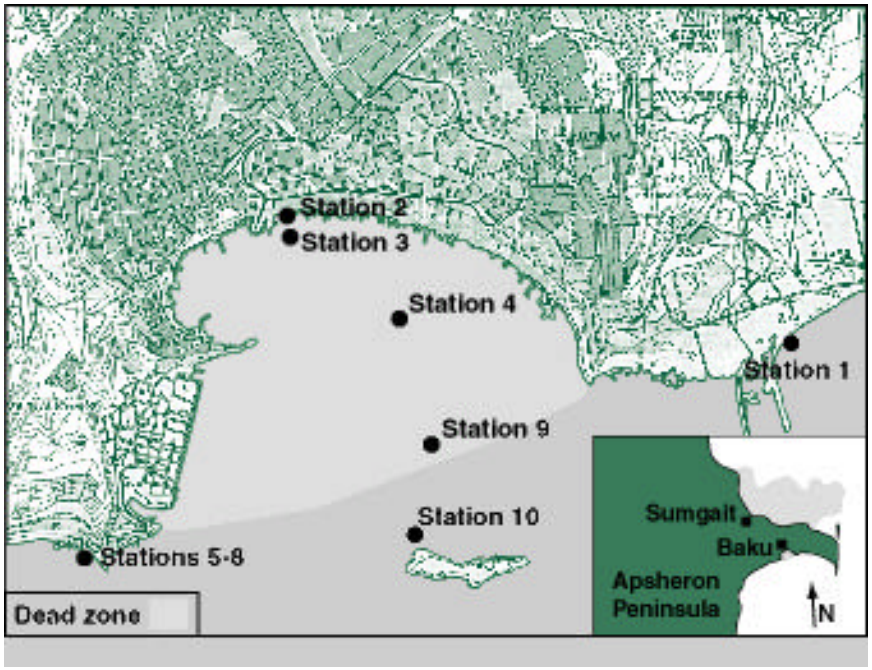

Figure 15. Locations of sediment sampling stations in and around Baku Harbor; dead zones in the harbor and on the north shore of the peninsula are shaded gray (Rowe 1996)

1996, the large amounts of historical waste are reportedly releasing pollution into the Caspian Sea over time. The coastal waters of Sumgait receive approximately 400,000 m^3 of domestic and industrial wastewater per year (Efendieva and Dzhafarov 1993).

The Kura is the largest river in Azerbaijan; it is polluted by agriculture and the mining industry and carries heavy metal pollution, including copper and molybdenum, originating in Georgia and Armenia (Dumont 1995; Bickham 1996). In 1988, 11 mt of fuel oil was accidentally released into the Kura and severely polluted the river for 200 km (Efendieva and Dzhafarov 1993). The portion of the Caspian Sea basin that lies in Georgia includes 29 rivers, 4 lakes and 3 reservoirs (Georgian Geoinformation Centre 1996). One of the rivers in the Caspian Sea watershed is the second largest river in Georgia, the Mtkvari. It is classified as highly polluted, after it drains 23% of the country (15,000 km^2) before it flows through Azerbaijan on its way to the Caspian Sea.

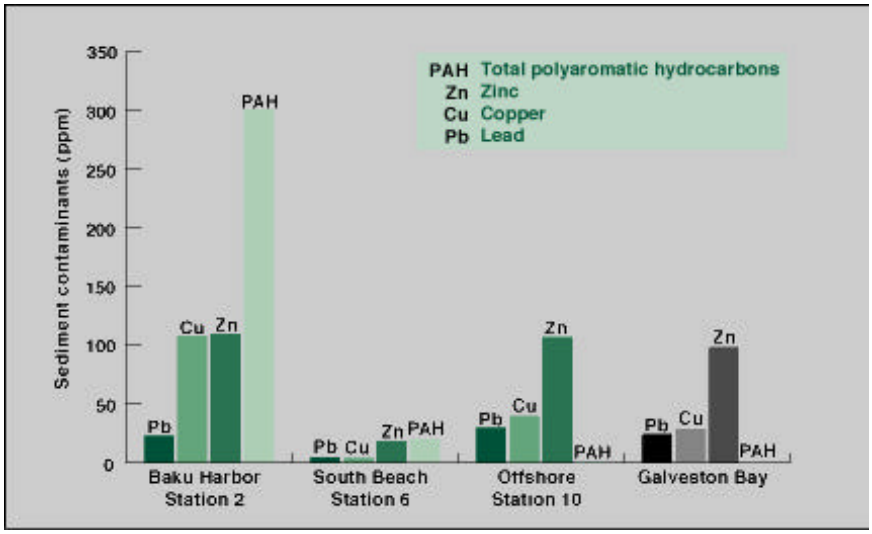

Figure 16. Concentrations of trace metals and PAHs in representative samples of sediment (Bickham 1996)

The city of Tbilisi contributes organic pollution to the Mtkvari, which exceeded maximum permissible limits by 1.5 times, phenols by 11 times, and nitrous ammonia by 4 times. The metallurgical, cement and Azoti factories of Rustavi contribute organic substances that exceed limits by 1.5 times and phenols by 12 times.

Deforestation is one of the major ecological problems in Azerbaijan that has led to erosion effects on water quality, among other impacts (Turyalay and Hajiyev 1994).

Iran

The major water quality issues facing Iran are related to deforestation, water and air pollution, and shortages of potable water (CIA 1997b; EIA 1998). The rivers of the Guilan Province of Iran receive discharge from solid waste dumpsites, 75% of which are located near or along rivers and 13% of which are sited on the shores of the Caspian (Abduli 1997). Hundreds of tons of solid and semisolid waste are dumped in rivers and surface waters every day in the province, and dumping at landfill sites is largely unmanaged and uncontrolled; 45 large-scale industries in Guilan dump their solid wastes at one landfill that is located 550 m from the Kacha River.

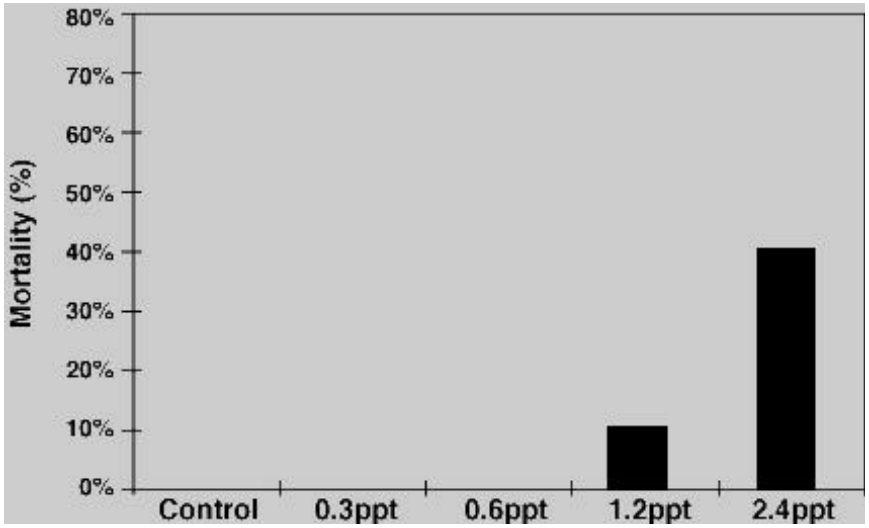

Figure 17. Mortality rates of sturgeon fingerlings (*Acipenser gueldenstaedti*) exposed to 1.2 to 2.4 ppt of sediment from Station 2 in Baku Harbor (see Figure 15) (Bickham 1996)

Pourang (1995) examined the levels of heavy metals in fish tissues collected in 1993 from the Anzali wetland in Northern Iran. They found levels of copper in the muscle tissue to average 1.3 ppm vs. 0.6 ppm in the average of 11 commercially important freshwater Caspian Sea species but well below human health limits of 70 ppm, which is 5000 to 12,000 times greater than water concentrations. Lead concentrations in the Caspian Sea species averaged 1.7 ppm, and the estuarian species, average ranged from 1.2 to 1.4 ppm below the 2.5 ppm recommended for human consumption by the Iranian Standard Bureau.

Turkmenistan

Agriculture is the leading cause of environmental damage in Turkmenistan (EIA 1997e; CIA 1997e). Poor irrigation techniques have resulted in soil saturation, salinization, desertification, and depletion of the Amu Darya River. Soil and groundwater are polluted with agricultural chemicals and pesticides. Turkmenistan is extending the Karakumski Canal, thereby allowing pesticide contaminated drainage water to enter the Caspian (Dumont 1995).

Nuclear Setting

In the Caspian Sea region of Central Asia, there are several nuclear reactors used for power production and research, and many nuclear sites remaining from activities FSU, including those of uranium mining and production, nuclear waste dumping, storage, fuel production, and PNEs. The Caspian basin (Figure 18) includes all of the sites north and beyond Moscow to the headwaters of the Volga River, the to the west to the source of each of the major river systems, the Kama, Ural and Emba, and the Kura to the east of the sea. However, for the purposes of this study, only those within the immediate Caspian Sea region are described in detail because of their direct potential impact to the sea and to the region's vulnerability to transnational conflict (B. Shaw, personal communication, June 1998; D.J. Bradley, personal communication, June 1998).

There are allegations made in the news and public information media about radionuclide contamination in the Caspian Sea (e.g., CIA 1997a, 1997c, 1997d; Greenwomen Environmental Information Agency 1997; Sievers and Aranbaev June 1997), but there is neither direct evidence pointing to specific source terms, nor any complete measures of contamination that has reportedly entered the sea (D.J. Bradley, personal communication, June 1998). TED (1997b; 1997c) gave no quantification, but reported that radioactive sediment from the Chernobyl accident of 1986 has reached the Caspian Sea by way of the Volga River and canal systems.

Reactors

Figure 19 and Table 4 indicate the sites of nuclear reactors for the production of power in the vicinity of the Caspian Sea, sited at Novovoronezh (Volgadonsk) (Figure 20), Balakovo (Figure 21), and Rostov in Russia, at Aqtau in Kazakhstan (Figure 22), and at Yerevan in Armenia (PNL 1998a, 1998b; INSC 1997, 1998b, 1998c, 1998g). Reactors for research are found at Tehran and Esfahan, Iran[3] and Dmitrovgrad, Russia (EIA 1998; INSC 1998a, 1998c). Others outside the immediate Caspian Sea area that could potentially have an impact on the sea, for example, via the Volga watershed, are probably at low risk of doing so (D.J. Bradley, personal communication, June 1998). Nonetheless, a recent report from the Bellona Institute (Kudrik 1997) reported accidental discharge of radioactivity to the atmosphere at the Dimitrovgrad Research Institute on the Volga River July 25-26, 1997. Discharge levels of ^{131} iodine were about 18 times above the normal levels (2.2 to 2.6 GBq

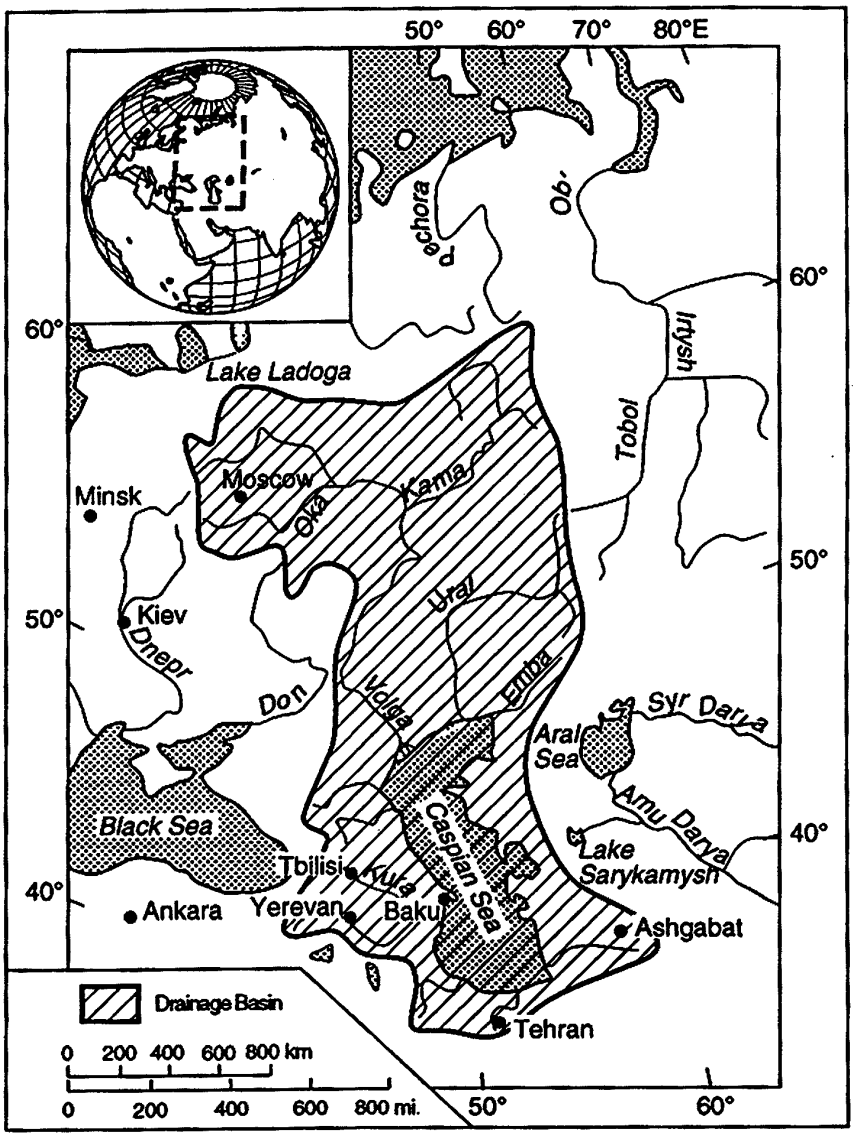

Figure 18. The Caspian basin (after Rodionov 1994)

Figure 19. Nuclear power and research reactor sites in the Caspian Sea vicinity. Reactors at Novovoronezh, Russia, Madzamor, Armenia, and Aqtau, Kazakhstan are online for power production; those at Tehran and Esfahan are for research.

for two days, 1.9 to 2.2 GBq for 5 days, above the regular levels of 122 MBq/day) for about one week (Kudrik 1997).

Berkeliev (1997) expressed concern that the nuclear energy station at Aqtau is problematic in light of the rising level of the Caspian Sea: water is not only currently closer to the reactor, he alleged, but also the groundwater has risen, and the sea is now physically connected to the reactor's cooling pond.

Nuclear Fuel Cycle and Nuclear Wastes

All phases of the nuclear fuel cycle, along with weapons testing, accidents, deliberate discharge of wastes, and disposal of industrial, medical, and research wastes could potentially

Country	Location	Reactor	Purpose	Reference
Armenia	Madzamor (Yerevan)	PWR[a]	Electricity	INSC 1997
Iran	Tehran	unknown	Research	EIA 1998; INSC 1998a
	Esfahan	ENTC GSCR[b] ENTC HWZPR[c] ENTC LWSCR[d] ENTC TRR[e]	Research	INSC 1998a
Kazakhstan	Aqtau	LMFBR[f] (BN-350)	Electricity	INSC 1998b
Russia	Novovoronezh (Volgadonsk)	PWR[g] (7 units)	Electricity	PNL 1998a
		VVER[h] (210 through 1000)		INSC 1998e
	Rostov (Volgadonsk)	PWR VVER (4 units)	Electricity	INSC 1998g
	Balakovo	PWR (4 units)	Electricity	PNL 1998b
		VVER-1000		INSC 1998f
	Dmitrovgrad	BWR[i] (4 units)	Research	INSC 1998c

a) PWR pressurized water reactor.

b) ENTC GSCR subcritical water reactor.

c) HWZPR tank-in-pool heavy water reactor.

d) LWSCR subcritical light water reactor.

e) TRR pool water reactor.

f) LMFBR liquid metal cooled fast breeder reactor.

g) EWG-1 tank-type water- and gas-cooled reactor.

h) VVER is a Soviet-designed PWR, in Russian called Vodo-Vodyanoi Energeticheskii Reaktor.

i) BWR boiling water reactor; at Dmitrovgrad, there are four different research BWRs: MIR-M1 (channels and pool);RBT-10/2 RBT-6 (pool); SM (tank)

Table 4. Nuclear Reactors in the Caspian Sea Vicinity

Figure 20. Reactor at Novovoronezh (Volgadonsk), Russia (PNL 1998a)

contribute to radionuclide contamination of the Caspian Sea. Nuclear fuel cycle activities include past and present uranium mining and milling operations, uranium conversion, enrichment and fuel fabrication, irradiation in nuclear reactors, and storage of wastes from every step in the process.

The major problems related to waste management that are reported for Russia, but which would likely apply to the other FSU republics, are as follows: large quantities of existing and newly generated radioactive wastes remain untreated; a lack of facilities for safely handling of radioactive waste and spent nuclear fuel; facilities that are not considered safe, do not meet current environmental requirements, and/or are filled to capacity. These problems increase the risk of radioactive contamination of the environment and for radiation accidents (Bradley 1997).

Although sites of nuclear activity are not as concentrated in the Caspian Sea region as in some other areas of the FSU, there are nonetheless a number of sites of potential concern. Near the Caspian Sea, Armenia, Azerbaijan, Russia, and Turkmenistan all contain regional radioactive material storage sites, called *radons.* For example, the radon at Baku, Azerbaijan, on the shore of the Caspian, does not treat wastes, but stores up to 25 m^3/year of solid and liquid radioactive waste materials. The radon facility at Yerevan, Armenia, stores up to 5 m^3/year of solid, liquid, and biological radioactive wastes, and spent ionizing radiation

Figure 21. Reactors at Balakovo, Russia (PNL 1998b)

sources. Rivers of northeast Azerbaijan flow directly into the mid-Caspian Sea; rivers of southeast Azerbaijan, the major one of which originates in Armenia and drains the Yerevan area, flow directly to the south Caspian. Therefore, any radioactive wastes carried from mining or former processing sites in these areas would also potentially be carried to the sea (ENRIN 1997b). Further, former uranium mining and processing sites and sites of PNEs are in the region of the Caspian and could pose risks from release of radioactive materials into the waterways that lead to the sea (Figure 23, Table 5). A detailed description and inventory of radioactive residues and wastes resulting from the FSU nuclear activities in this region can be found in Bradley (1997).

On the Turkmenistan coast of the Caspian, two chemical factories that use activated charcoal in their industrial processes have released radioactive wastes onsite at Cheleken Chemical Factory and Nebit Dag Iodine-Bromide Factory (Figure 23, Table 5). The total radioactive pollution at the former site has been monitored at 200,000 Bq/kg (average 80,000 Bq/kg) of wastes, in a total of 15,000 to 18,000 mt of wastes that are accumulated around the factory (Berkeliev 1997), which would equal a total maximum activity of about 40 Ci (D. Bradley, personal communication). There are also deposits of radiobarites in old wells drilled for oil, gas, and industrial salts at Cheleken, the total radioactivity of which was estimated at 10 million Bq (.0003 Ci) in 1966 (Berkeliev 1997).

Figure 22. Nuclear sites in the Caspian Sea vicinity (see Table 5 for detail)

Although detailed information is not available, it is strongly suspected that PNEs were carried out for industrial purposes at least once in 1972 in the Mary Region of Turkmenistan to seal a gushing petroleum well, and similar PNEs were carried out in the Ustjurt and the Kyzlkum of Kazakhstan near the Turkmenistan border (Berkeliev 1997; Bradley 1997; Figure 23, Table 5).

Fisheries

Background

As the world's largest low-salinity lake, or enclosed inland sea, the Caspian presents a unique environment, and thus a

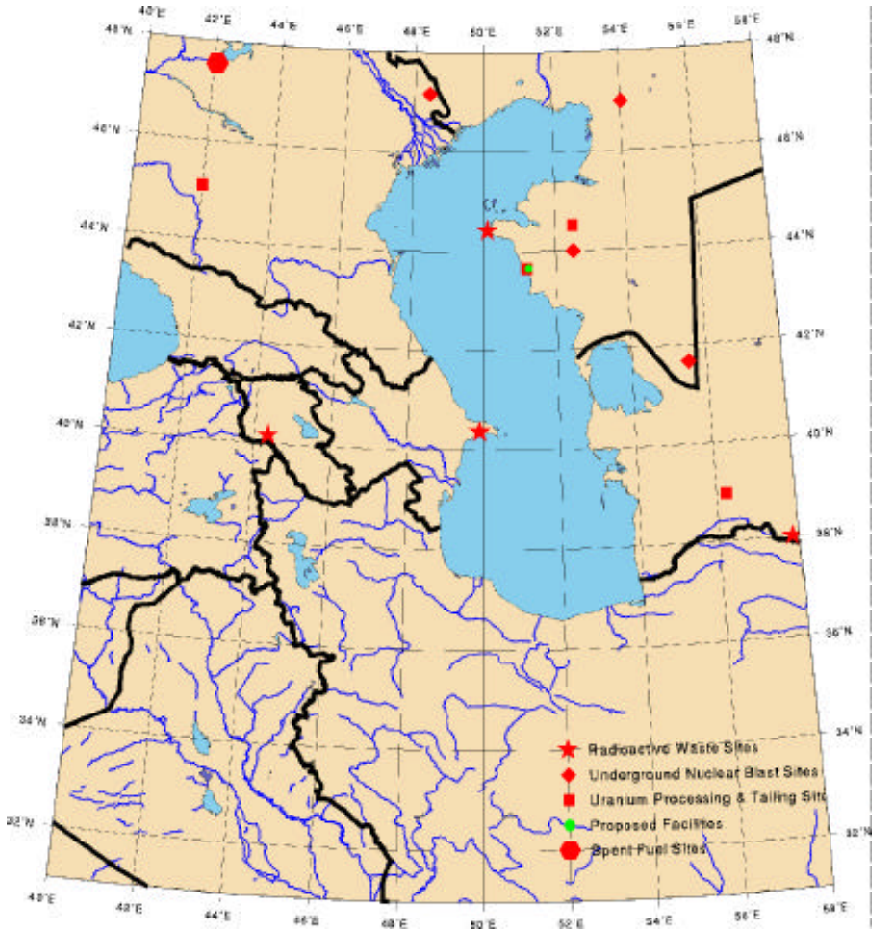

Figure 23. Dynamics of flooding of the Volga River delta at different sea levels (TES 1992, cited in Kaplin 1995)

unique fisheries complex. Seasonal thermocline in the Caspian Sea limits the influence of surface temperature fluctuations on benthic communities and bottom-feeding fish stocks such as sturgeon to the top 200 m in the north Caspian and to the top 100 m in the deeper south Caspian basins. The other unique environmental feature of the Caspian Sea that affects the fisheries is the long-term fluctuation in the water level. This phenomenon is discussed elsewhere in this paper, but it has been

Country	Location	Facility	Facility type	Reference
Armenia	Yerevan	Radon[a]	Radioactive waste storage	Bradley 1997
Azerbaijan	Baku	Radon	Radioactive waste storage site	IAEA 1995 (in Bradley 1997)
Kazakhstan	Mangyshlak	Uranium strip mine	Uranium processing	Berkeliev 1997
	Mangyshlak	Underground nuclear test site	Peaceful nuclear explosions (three)	Bradley 1997
	Aqtau	Kaskor uranium mill	Uranium tailings	Bradley 1997
	Plato Ustijurt	Underground nuclear blast site	Peaceful nuclear explosion	Bradley 1997
	Sarykamys area	Underground nuclear blast site	Peaceful nuclear explosion	Bradley 1997
	North shore Caspian near Kazakhstan western border	Underground nuclear blast site	Peaceful nuclear explosions (series)	Bradley 1997
Russia	Novovoronezh, Volgadonsk	Novovoronezh Reactor site	Spent fuel storage	INSC 1998d
	Lermontov	Uranium mine	Uranium mine	Bradley 1997
	Volgograd and Samara on the Volga River	Radon	Radioactive waste storage site	Bradley 1997
	Dmitrovgrad	Dmitrovgrad Research Institute	Radioactive waste injection	Bradley 1997
	Dmitrovgrad	Dmitrovgrad Research Institute	Accidental discharge	Kudrik 1997
Turkmenistan	Cheleken	Cheleken Chemical Factory	Industry using activated charcoal	Berkeliev 1997
	Nebit Dag	Nebit Dag Iodine-Bromide Factory	Industry using activated charcoal	Berkeliev 1997
	Kizilkaya	Gyusha transfer station	Uranium mining, transfer	Berkeliev 1997
	Karakumskij Canal, Ashkabad		Radioactive waste storage site	Bradley 1997
Uzbekistan	Kyzlkum near Kazakhstan border	Underground nuclear blast site	Peaceful nuclear explosion	Berkeliev 1997

a) Radon is a regional radioactive waste storage site in the FSU republics.

Table 5. Nuclear Fuel Processing Facilities, Radons,[a] and Other Potential Sources of Radioactive Pollution in the Caspian Sea

determined by Kaplin (1995) that the optimal level for fisheries production in the Caspian is –27±1 m. With water heights above this level, valuable spawning grounds are submerged in the Volga delta, and flooding of previously dry, former oil-production areas on land could introduce industrial pollution into the sea (Figure 24). Below this level, at a level of -30 to -30.5 m, fish catches also decline, as occurred during the water level drop of the 1930-1977 period. Some estimates indicate the 1930-1977 drop was as much as 60%, although insufficient data exist to verify this number (Kaplin 1995).

The sea-level conditions along with the meteorological parameters characterize the Caspian Sea fisheries' physical environmental regime, and they are the major drivers for the life cycles, feeding, and migration patterns that represent the natural controls on the historical wild capture fisheries. Because of the north-south asymmetry in the seasonal temperature of the upper portion of the Caspian Sea, many species, particularly the sturgeon (Acipenseridae), kilka and dolginka (*Cluponela* sp.), migrate to the north in summer to feed and to spawn, and south in the winter to the middle or southern basins. In the last decade, however, Iran initiated a significant effort to increase aquaculture production of sturgeon and shrimp in the south Caspian Sea (Abbasian 1997). The environmental factors that affect aquaculture are similar to those that affect wild-capture fisheries, with the exception of small long-term changes in water level and other factors that might have an effect on primary and secondary productivity. Most aquaculture programs presume that feed will be provided, because of the high population density, and that feeding would be controlled for optimal growth of the stocks in culture. Thus, the major requirement for aquaculture is clean water with high dissolved oxygen levels to avoid stressing the stocks in culture. A second requirement would be no toxic algal blooms, and no introduced parasitic organisms, or introduced organisms that might compete for available food sources in the pelagic, neritic, epibenthic or benthic communities; Historically, none are believed to exist in the Caspian Sea.

Caspian Sea Fisheries Resources

The Caspian Sea is favored by specific conditions that result in high productivity and a unique composition of icthyofauna. The high productivity is the result of high levels of solar radiation, as a result of its latitude range. High insolation is

combined with large inputs of nutrient salts carried by the rivers entering the sea, as well as with a large pool of nutrients and organic matter involved in the primary and secondary production cycles of the sea, the phytoplankton and zooplankton. This primary and secondary production then support dense populations of larger fish and mollusks. Vertical mixing of the waters of the sea driven by evaporation in summer and cooling in winter also cause the bathypelagic layers, with rich nutrient content, to rise to the surface. This action releases the nutrients from entrapment in the depths (Kaplin 1995). Finally, the low salinity of the Caspian Sea has allowed the entry of many freshwater fish species to the basin to take advantage of this high productivity.

According to Kasymov (1990), there are 42 genera of fish (family Pisces) with 100-114 species, 13 genera of mollusks (family Mollusca) with 118 species, and 1 genus of mammals (family Mammalia) with 1 species among the fauna of the Caspian Sea. Of the total 219 species, 20 species (1 mammal and 19 fish) make up the majority of the fishery harvest in the Caspian Sea **(**Kaplin 1995**)**. These include the Caspian seal (*Phoca caspica*); 4 species of sturgeon; 3 species of pike (*Esox lucius*, *Silurus glanis, Perca fluviatilis)*; 3 species of Caspian shad (*Alosia caspia caspia, Alosia brashnikova, A. saposhnikova*), kilka, and dolginka; bream (*Abramis brama*); kutum (*Rutilis frisii*); and Caspian salmon (*Onchyorynchus kheta*).

Period	**Total (thousands of mt)**
1946-1950	224
1951-1955	350
1956-1960	262
1961-1965	149
1966-1970	131
1971-1975	152
1976-1980	77

a) Data from TES 1992, cited in Kaplin 1995.

Table 6. Total Catch of Sturgeon, Pike-Perch Bream, Wild Carp, and Roach in the Volga-Caspian Basin 1946-1980[a]

Although there are several smaller artisinal and commercial fisheries, such as crayfish and pike (*Esox lucius*), that can have local impacts, there are three fisheries with high economic profiles, and thus high sensitivity and potential for conflict. These are the sturgeon fisheries, the kilka fishery, and the herring/shad fishery. These fisheries could total 250,000 tons of sustained annual production, determined by long-term management studies during the Soviet era (Kaplin 1995).

Historical Caspian Sea Fisheries

Prior to the breakup of the FSU, the fishery in the Caspian Sea was divided between the countries of Iran and the FSU. Extensive fisheries research was conducted by FSU from research centers in Astrakhan and Baku starting in 1904 and 1912, respectively (Karpinsky 1992). Catch records were well maintained and extensive, as was fisheries research for the Volga-North Caspian basin during this period (e.g., Kaplin 1995; Khodorevskaya et al. 1997) (Table 6).

After the breakup of the FSU, the fishery resource was divided among the five new states with shoreline on the Caspian Sea. This was done by common agreement in a letter of understanding between the five countries on February 18, 1992 but disputes as to mineral extraction rights tended to fall back on land claims under other treaty basis and have prevented any agreement on allowable catch limits (Kaplin 1995; Khodorevskaya et al. 1997; TED 1997b, 1998b). Allocation issues are moot, however, because the fishing fleets are obsolete and in poor repair. As an example, Turkmenistan is presently unable to harvest or process the 50,000 mt allocation it claims (Hamlin 1998). Fishery protection under the FSU conditions was exercised through various Russian government and military offices, and Iran exercised its own control through Shilat, the Iranian state fisheries organization. Fishery protection in the present period is exercised through negotiation among the five countries and common agreement with enforcement within each sector under each nation's control. However, the existing enforcement is weak to nonexistent outside of Iran. Poaching, particularly of sturgeon, is a significant problem on the Volga and Ural Rivers in Russia and in the north Caspian Sea (Byalodelete vv 1997; Gritchin 1997).

Sturgeon

Commercial sturgeon fishing and the caviar (sturgeon roe) trade in the Caspian Sea date to the reign of Peter the Great, who designated fifty royal fishermen to control the fishery in 1672. The Bolsheviks maintained the monopoly in 1917, and Russia and Iran limited the harvest until the breakup of the Soviet Union in 1991 (TED 1997b). The Caspian is recognized as the only body of water to support six different species of sturgeon (Efendieva and Dzhafarov 1993). However, there are only three commercial species of wild sturgeon in the North Caspian Sea, the beluga (*Huso huso*), stellate (*Acipenser stellatus*) and Russian (*A. gueldenstaedii*), and one in the south Caspian, the Persian sturgeon (*A. persicus*). Prior to 1951, commercial sturgeon fishing was performed in the open Caspian Sea with nets. At that time, it was recommended that the fishery be restricted to the delta and lower reaches of the Volga River, and net fishing was banned in the open sea (Khodoreveskaya et al. 1997). Also starting in the 1960s, the Soviet Union released gradually increasing numbers of juvenile sturgeon, particularly the more desirable beluga sturgeon to supplant dwindling returns. The decreasing water level in the Caspian was held to blame, but dams on the Volga and other pollution and habitat loses were given equal weight. Hatchery releases started at 4 million and ended at 80 million juvenile sturgeon annually in the late 1980s (Khodoreveskaya et al. 1997).

Presently, the breakup of the Soviet Union, and financial strictures in Russia and the modern countries of Kazakhstan, Azerbaijan, and Turkmenistan have reduced the number of hatchery release levels to less than that necessary to sustain the fishery (Khodoreveskaya et al. 1997). The presence of the extensive poaching and over-harvest by the new countries of Kazakhstan and Azerbaijan have driven adult populations to dangerous lows, possibly near to extinction. Further, starting in 1984, pollution- induced stress was noted in all three commercial species of *Acipenseridae* (Voropaev et al. 1992; Efendieva and Dzhafarov 1993; Veshchev 1995; Khodoreveskaya et al. 1997). The symptoms of muscle atrophy due to degeneration of the fibers of the striated muscle tissue seem to be related to diesel fuel and chlorinated hydrocarbons, and they result in nonviable embryos from the sturgeon eggs. High levels of pesticides and heavy metals in livers, gonads, and muscle of sturgeons, and the

appearance of tumors in the tissues indicate that the effect of increasing levels of pollution in the Caspian from the Volga and from shoreline industrial waste discharge will intensify in the near future in the north and mid-Caspian Sea (Khodoreveskaya et al. 1997; Akimova and Ruban 1996). At this time, all sturgeonno italic species in the Caspian sea are listed as endangered by the Sturgeon Specialist Group and the International Union for the Conservation of Nature (IUCN) World Conservation Union (Sturgeon Specialist Group 1997).

There are some mitigating forces that balance the sturgeon problems in the north in the southern Caspian Basin. In 1989, Iran relaunched its caviar trade, shut down since 1979, because it was allegedly against Islamic law. Islamic fundamentalists in a reaction against the programs of the deposed Shah of Iran said sturgeon did not have scales, and thus were not *hala*, and therefore, acceptable under Islamic law. In 1982, a mullah in a coastal village determined that sturgeon actually do have scales, and after discussion by theologians of the religious body, *Qom*, determined that sturgeon and sturgeon products scales are acceptable under Islamic law. The late Imam Khomeini lead the country toward an expanded fisheries through the establishment of Shilat. With a research facility at Sari in the Caspian Sea province of Mazandaran, Iran has had remarkable success in the aquaculture of beluga as well as other species of sturgeon (Abbasian 1997; TED 1998b).

On November 16, 1996, the five Caspian Sea countries signed an agreement to ban all sturgeon fishing in the Caspian Sea except in the deep channels of the Volga delta, with equal fishing rights for all of the FSU countries at this location (Khodoreveskaya et al. 1997). However, rampant poaching in the Volga delta and Caspian Sea by Kazakhstan and Azerbaijan, and the tacit involvement of the Russian government in 1997 led buyers more often to seek Iranian caviar. This trade is partly driven by the poor quality of some of the poached product, but more the control by Shilat of the entire Iranian production and distribution through reputable dealers of long standing. Further, Iran also processes and distributes Turkmenistan caviar, because that country lacks production facilities. Thus, a steady Caspian Sea caviar supply appears to be available independent of Kazakhstan, Azerbaijan, and Russia.

Total production for any one of the northern Caspian Sea countries is hard to establish due to the widespread poaching. Totals are about 3100 mt, although only 90 mt were legally extracted in 1995 (Khrushchev 1997). This amount is expected to drop with time due to overfishing, poaching, and failure of the hatchery system. In contrast, in 1995 Shilat exported 146 mt from a total catch of 182 mt (Abbasian 1997). In 1997, Iran was able to export the legal production of Turkmenistan, which would increase its production in addition to its own resources. Iran has established a target of 250 mt of caviar for the year 2020 (Abbasian 1997).

Kilka

Although the sturgeon fishery is the highest-profile fishery, the kilka fishery is larger, employs more people, and has a higher potential for conflict. In 1995, Iran harvested 41,000 mt of kilka, with 2050 mt for domestic consumption and 85 mt for export; it has targeted over 110,000 mt for harvest, with 60,000 mt for local consumption in 2020 (Abbasian 1997). These figures are up from 1991 and 1992, when 14,000 mt and 21,000 mt were harvested, respectively. This represents in part the success of a planned change in per-capita fish consumption in Iran from 1 kg in 1985 to 4.7 kg in 1995. In 1991 and 1992, the kilka fishery provided employment for about 13,000 fishermen, which was more than 10% of the work force in the entire Iranian fishing industry (Iran Public and International Relations Department 1995; FAO 1996). Further, Iran has developed export products based on fish protein concentrate (FPC) targeted at a far east market in Japan and China (Shojaei 1998).

At the same time, Iran's neighbor, Turkmenistan, lacks the capability to harvest its own kilka stocks and only took 7660 mt in 1995 and 8500 mt in 1996 of an allotted 45,000 mt (Hamlin 1998). The Turkmenistan fishing fleet was capable of meeting its harvest allotment in the 1960s and 1970s, when its fleet and processing plants were in good repair, but this is no longer the case (Hamlin 1998). Although the level of kilka catch in the other Caspian Sea nations is not reported separately, it represents a major source of income, food, and employment.

Caspian Seal

The Caspian seal has been both hunted and protected for decades. Estimated at 500,000-600,000 animals for the whole Caspian Sea, it is native only to the Caspian, although it is related to the Ring Neck seal (*P. hispada*) of the subarctic and arctic regions (Vetter et al. 1995). Other estimates place the population between 360,000 and 400,000 (Yampolsky 1996). An annual harvest of 40,000 seal pups is made in the Caspian Sea under what are alleged to be harvest quotas derived from the 1980s. Separate quotas for harvest allowances by Russia, Kazakhstan, and other Caspian states are not enforced. As in the case of sturgeon, accurate records are not presently kept in the north Caspian. The "white skin" pup fishery is said to be in support of German clients (Yampolsky 1996). Total net birth rate for the Caspian seal has been estimated at 50,000/year.

Recent anecdotal reports indicate some poaching on Maly Zhemchuzhny Island in the northern Caspian of *P. caspia* stocks by research institute workers tasked with studying the colonies on islands in the Russian sector off the Volga delta. Poached carcasses are alleged to be used for mink farm food in Astrakhan, but Kazakhstan is also implicated in the seal poaching (Yampolsky 1996). Overharvest and poaching seem to be major concerns. The study by Vetter et al. (1995) indicated that although organochlorine compounds were detected in the carcass of a natural mortality *P. caspia* found in Iran, DDT and its residues dominated the organochlorine compounds and were at lower levels than those seen a decade ago.

Introduced Species

Since the early 1920s, more than 30 species have been introduced to the Caspian Sea (Karpinsky 1992). As an example, *Corbulamya*, a small mollusk no more than 12 mm in length, was introduced by Russian scientists in the 1970s along with *Mytilus galloprovincialis*, the blue mussel, and *Dreissena polymorphia*, the zebra mussel, as food for sturgeon (Zevina and Maev 1972). Also, the Volga-Don canal connects the Caspian with the Sea of Azov by an open channel, allowing the introduction of species via the Volga River delta. The appearance of each new species has caused the rearrangement of bottom communities, and changes in their productivity and species composition. The probability of

new species from the Azov Sea is high and may cause unpredictable results. Recently, concern has been expressed over the possible introduction of *Mnemiopsis leidyi*, the comb jelly, which has caused severe ecological problems in the Black Sea and Sea of Azov (Newman 1998). However, Bronfman (1995) noted that at salinities below 13%, *M. leidyi* will not thrive, as evidenced by its decline in the Sea of Azov during prolonged periods in the 1970s and 1980s of such salinity levels. Thus, it is doubtful that it will succeed in the Caspian Sea, because it cannot tolerate the low salinity (Figure 7).

Aquaculture Production in the Caspian Sea

Historically, Russia maintained hatcheries in all of the modern northern Caspian Sea countries were producing salmon, sturgeon, and trout for release to the Caspian Sea. Since 1991, production of sturgeon has been going down steadily due to financial strictures (Khodorevskaya et al. 1997). In Iran, Shilat has many species, including all three commercial species of *Acipenser*, in culture. Brood stock is presently a problem with sturgeon due to poaching in the northern and mid-Caspian Sea.

Iran has banned all netting in the open part of the South Caspian, which it controls (Abbasian 1997). Fisheries are concentrated on the near shore shelf, and large-scale hatchery releases of sturgeon, kutum, bream, pike-perch, and Caspian trout are made to ensure that the local fishery remains strong (Fish Farming International 1997; Abbasian 1997). Iran uses international cooperation from United Nations Food and Agriculture Organization (FAO), World Bank, and UNDP to develop technology and resources (Fish Farming International 1997; Abbasian 1997).

Oil Production and Fisheries Risk

Although several papers project a potential ecological "disaster" in the Caspian Sea from drilling and its attendant chemicals and compounds (e.g., Kasymov and Velikhanov 1992), there is contrary evidence that points to lesser impact. Drilling in the Caspian, for example, will have to conform to ISO 9000 and ISO 14000 business and environmental standards, if the product is to be sold in the European Union (EU). This should mandate better environmental standards than those applied during the past 70 years under FSU control.

Use of the Environment as a Terrorist Target

Developing economic and political structures in the emerging independent littoral states of the Caspian region are especially sensitive to interruptions and threats. The use of western oil and gas infrastructure as a bargaining chip or terrorist objective can be heightened and brought to the international community's attention through the environmental damage and potential sensational claims available to nationalistic and radical religious groups. There is a firm basis for this approach developing in Colombia: Approximately one-third of the attacks were against U.S. targets, and most of those consisted of low-level bombings of multinational oil pipelines in Colombia.

Oil and Gas Development

Background

A critical issue facing the region is the development of oil and gas reserves. Experts suggest that the Caspian Sea and associated basin contain the third largest reserve of oil and natural gas in the world, behind the Gulf region and Siberia. Drilling for oil in the region is not new. Oil derricks dotted the landscape during the latter decades of the nineteenth century. Oil was a major source of hard currency for the FSU, but drilling methods were technologically inferior compared with those of Western firms for large-scale oil exploration. This inhibited Soviet exploration in the Caspian region. In the mid-1980s, the Soviet Union's oil exploration sector was poised to reap benefits from the Western technology and investment; the breakup of the Soviet Union, however, put a hold on these plans, because several nations claimed sovereignty in the FSU lands around the Caspian Sea.

There are significant environmental concerns associated with drilling for oil in the Caspian region. Impacts are possible from five general elements of the industry: exploration; drilling; production; gathering, transportation, and distribution; and refining and processing (Table 7).

The major issue regarding oil exploration in the region is a question of how best to deliver the oil to world markets. The Caspian Sea area is landlocked; thus, the only way to efficiently transport the oil to world markets is via pipeline. The exact route of such a pipeline is as of yet undetermined, and may prove to be the

single most important factor in determining the ultimate success of oil exploration in the region.

Pipeline Route Objections

The most frequently cited objections to routing pipelines across the Caspian are two related issues: active tectonic zones and mud volcanoes on the sea floor. In both cases these areas of concern are limited to the southern Caspian and pipeline routes can easily avoid the problem areas.

The region has two major belts of seismicity. One runs along the Zagros Mountains in southern Iran along the Persian Gulf. The other belt runs through northern Iran around the Caspian Sea. Earthquakes in this northern belt typically show strike-slip faulting. They are particularly hazardous because many people live in this region. This northern seismicity belt connects the tectonic activity in Turkey, to the west, to the on-going mountain building and seismicity in the Himalayas to the east.

A mud volcano is a small cone of mud and clay, usually only a meter or two high, built as mud is thrown into the air by escaping volcanic gas from a bubbling mud pot. The mud and clay forms as volcanic gases dissolve in hot ground water, creating an acidic mixture that turns solid rock into clay-sized fragments.

Heavy tanker traffic thorough the Mediterranean, Red Sea, and Persian Gulf have already alerted states to the pollution potential of such activities. Increased production in the Caspian region could increase the above effects, no matter which pipeline route is eventually chosen. Unique to the Caspian region however, are the ongoing sea-level changes. The sea could rise possibly 3 m in the next 25 years, with consequent environmental damage. In the last decade, it rose 1 m, already inundating some parts of Baku. Some of Iran's most productive fields lie on the southern shores of the sea and could be submerged if the sea were to continue to rise.

The petroleum issue needs to be quantified and mapped in accordance with modern pollutant transport modeling and with remote sensing. This task requires expansion, quantification, and integration of information obtained in environmental baseline evaluations with the projections and condition assessment of infrastructure challenges.

Environmental Vulnerability

The Volga contributes 78%-85% of the freshwater flow into the Caspian and therefore controls the fate of resources affected by freshwater availability. Because there is significant debate over whether the amount of Volga River flow or its seasonal to annual variability is anthropogenically controlled or a natural fluctuation, it is not clear how to stabilize the Caspian Sea level. Without the ability or the knowledge of how to control the Caspian Sea level, resources that depend on the sea level stability are at risk.

Many investigators associate an anthropogenic control of the sea level with climate shifts triggered by human activity inside as well as outside the Volga watershed, and therefore conclude that there is a shared, multinational responsibility for the Caspian Sea level fluctuation. Even if there were a single country that surrounded the Caspian Sea, there would still be problems and tradeoffs in solutions related to the sea level rise, pollution, and resource development; that is, the environment would still be vulnerable to damage, regardless of national politics. However, because there are multiple countries involved, shared legacy pollution and management issues, emergent highly profitable resources, divergent cultures, and debates over the scientific explanations for the sea level rise, there is no doubt that there will continue to be environmental vulnerability associated with the Caspian Sea level rise.

The most technologically developed areas of the Caspian Sea region, including Central Russia, the Urals, Azerbaijan, Kazakhstan, and Turkmenistan, have had the greatest impact on the water quality of the sea. Increased urbanization, industrialization, and harvesting of natural resources have led to particularly heavy impacts in the northern region. In addition to pollution issues, the quantity and quality of fresh water is of cross-border concern; in other regions, water supply has been a flashpoint issue.

Fisheries in the Caspian Sea in general do not present a point for potential regional conflict. Most major commercial stocks are mobile and at stock levels beyond present harvest capability due to fisheries infrastructure failure in FSU countries. High-profile species such as sturgeon are at risk, but their decline would affect only local populations of harvesters and poachers on a seasonal basis. Poaching is a local and seasonal issue in the north and

Infrastructure Element	Principle Activity	Environmental Vulnerability
Exploration	Seismic acquisition •Marine •Onshore	Onshore: Effects of vehicle passage, energy sources and short hole drilling Offshore: Effects of energy sources on fisheries insert return to provide spacing of table entries
Drilling	Exploration and Development •Marine •Onshore	Onshore: Leakage of drilling fluids, produced water and operational contaminants Offshore: Disposal of drilling cuttings, fluids and waste from operations, damage to sensitive marine ecosystems, seafloor damage Both: Danger of wellhead failure and blowouts with associated oil spills and contamination
Production	Gathering systems Production processing and location storage	Crude oil leaks during operations and transfer to gathering and pipeline systems. Modern (western) infrastructure minimizes these leaks significantly.
Gathering, transportation and distirbution	Gathering systems •Pipelines •Barges •Tankers •Marine terminals	Pipelines: High likeihood of leaks, large volumes of crude oil Storage systems: Leak prone and highly vulnerable to operating conditions Tankers, Barges and Marine terminals: Spills, discharges, and leakage
Refining and processing	Crude refining •Chemical intermediates •Fuels	Refineries: Significant air pollution sources Significant ground water contamination Refined products with much higher toxicity and persistence in the environment

Table 7. Vulnerability to Oil and Gas Exploration and Development Impacts

mid-Caspian, and will likely decline with the increase in catch per unit effort that accompanies overharvest.

The most likely primary point for fisheries-related conflict comes from the mixture of religion, economics, politics, and fisheries aquaculture that exists in the southern Caspian Sea. Iran and Turkmenistan share more than a common border in the south Caspian. Iran harvests and processes fisheries product for Turkmenistan, including caviar, and probably shares some common religious heritage. Iran's ambitious aquaculture program is both an employment program for the local populace, a major dietary change program involving a shift to fish as a protein source, and an export product-generating program, with several foreign investment and support partners. Combined with the major investment in aquaculture in Iran and the desire to maintain hegemony in the south Caspian in oil and fisheries, Iran could possibly initiate local- to regional-scale conflicts, if its aquaculture program were seen to be threatened. Potential ecological threats could include those due to spreading pollution from shoreline sources or to introduced species in tanker ballast water, or to ecoterrorism over oil rights/boundary issues and poaching.

There is public concern for potential radionuclide contamination in the Caspian, particularly because there are known contaminated sites that could be inundated with the rise in sea level. Media coverage, portrays anger directed at the FSU for poor handling of residual wastes and for PNEs and other sources of radioactive contamination in the former republics, now independent nations, surrounding the Caspian.

There is potential for contamination from any of the sites associated with the FSU nuclear fuel cycle, including accidents at nuclear power or research facilities, and when it enters the sea, it becomes a cross-border issue. Although sites of nuclear activity are not as concentrated in the Caspian Sea region as in some other areas of the FSU, there are nonetheless a number of sites of potential concern. Near the sea, Armenia, Azerbaijan, Russia, and Turkmenistan all contain regional radioactive material dump or management sites, called *radons.* Former uranium mining and processing sites, sites of PNEs, nuclear waste injection sites, and others, ring the Caspian and could pose risks by release of radioactive materials into the waterways that lead to the sea. Other sources of radioactive wastes are chemical

factories that use activated charcoal in their industrial processes, such as those at Cheleken and at Nebit Dag in Turkmenistan.

Impacts are possible from five general elements of the oil and gas industry: exploration; drilling; production; gathering, transportation, and distribution; and refining and processing. Each of these elements has unique activities and vulnerabilities. By far the greatest vulnerability to large-scale environmental damage is the pipeline infrastructure. Given the overall age and condition of existing pipelines and the proximity to the Caspian shoreline, which is changing, the likelihood of severe compromise of the system is high. Nonetheless, there are several concerns associated with each element.

The most frequently cited objections to routing pipelines across the Caspian Sea are two related issues: active tectonic zones and mud volcanoes on the sea floor. In both cases, the areas of concern are limited to the southern Caspian, and pipeline routes can easily avoid the problem areas.

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Pacific Northwest National Laboratory Richland, Washington 99352

REAR ADMIRAL JOHN SIGLER

DIRECTOR OF PLANS AND PROGRAMS HEADQUARTERS, U.S. CENTRAL COMMAND TAMPA, FLORIDA

The Central Command (CENTCOM) is headquartered in Tampa, Florida. At present, CENTCOM is assisting with the conflict between Ethiopia and Eritrea, and is also involved in Iraq. The CENTCOM area of responsibility (AOR) includes Eastern Africa, areas of Southwest Asia and Central Asia, which includes the countries of Iran and Afghanistan. CENTCOM assumed responsibility for the Central Asian region on the first of October 1988. Regarding the peacetime engagement mission, I will identify those factors that relate to CENTCOM's engagement strategy for Central Asia.

CENTCOM'S Central Asia AOR

I will also discuss the impact of the Caspian Sea resources on that engagement strategy, and then I will explain our engagement strategy.

The general economic and political trends in the area are important to understand. As it stands, the economies in Iran and Russia are weak, which complicates their ability to participate in engagement activities. Our situation with Iran somewhat different because the political situation is stressful, but particularly for Russia we are not able to engage with them like we desire.

GENERAL TRENDS

- Increased Russian and Iranian influence
- Improved relations with the West
- Proliferation of WMD

Due to the weak economy in Central Asia, we do not have activities going on that involve the Russians. We are attempting to engage with the Central Asians in a transparent manner, making certain that all parties are aware of our programs in order to calm any kind of residual fears in the area. Russian and Iranian influence may increase, in the future, as their economies improve; hopefully our relations with Iran will improve.We believe that establishing of national identities in Central Asia will develop confidence within the Central Asian region, and in the long run, our relations with Central Asia will gradually improve. We would like to be part of building that confidence, and working with the Central Asian States as equals.

The other general political trend that concerns us is weapons of mass destruction (WMD). While WMD is not a core issue for the Central Asian states, it is for the U.S. because of the WMD programs of Russia and Iran. The importance of WMD to the Central Asian states depends on how they perceive Iran. Do they perceive Iran as being less rational than the Russians, who also possess weapons of mass destruction. Presently, Iran's position on WMD creates a barrier to improving Iranian/U.S. relations. WMD is an important factor, however, our relations with the Central Asian states can proceed in spite of possible

developments in the weapons of mass destruction position Iranian.

The stated goals of Central Asian countries are development and progress towards democracy. The Central Asian region is particularly challenged because they are in turbulent area. In the North, Russia's economic situation is causing instability. In the South, Iran is concerned with Islamic fundamentalism particularly with its southern neighbors. The very difficult situation in Afghanistan bears close scrutiny and could have major implications for regional stability. In this region we are trying to introduce elements of stability in societies which have not developed the type of civic culture that lends itself to the political fundamentals of democracy. However, in spite of the problems that the Central Asian nations may have experienced in developing the basis for democratic institutions, their societies appear to be stable. When we examine the political economic equations of what leads to state stability, Central Asia appears to be on the road toward democratic and economic development in a way that affords us an opportunity for further engagement.

We are trying to develop a political dialogue with Central Asia, primarily with Kyrgyzstan and Turkmenistan. At our Central Asian Region Symposium we discussed important issues with the Central Asians, and other members of the security community with interests in Central Asia. We found that efforts to establish an effective political dialogue with Central Asia are complicated by a number of factors. One of the factors is a language barrier; particularly critical when discussing access, building military bases and placing American troops in the area. While the countries remain suspicious about relations with the United States, we believe that, if national identities are strengthened and political institutions are built, the resulting national confidence may create a better work environment for future cooperation.

While relations between the United States and Iran remain poor, an improved relationship in the future cannot be ruled out. While an improvement in relations will not change U.S. policy for energy resource distribution it will provide solutions for some short-term political and economic considerations and region. Unfortunately, an improvement in relations with Iran is not a short-term reality. Near-term economic growth in Central Asia is expected to be very limited. The restrictive environment for

foreign investment, slow pace of economic reform, and the inefficient state energy and other industries portend some hard times ahead. However, the economic malaise in Central Asia is part of a regional problem that highlights difficulties of distributing Caspian Basin energy resources through Russia. The cooperation of Russia and Iran could help the region make the necessary changes for themselves, and avoid the political pressure that can result from faltering economies. Economically, the Central Asian states have a long way to go.

CENTRAL ASIAN ECONOMIC TRENDS

- Slow economic development
- Strengthening of Russian and Iranian economic influence
- Economic crisis mitigated by oil market

For some countries such as Kyrgyzstan or Turkmenistan, revenues from energy sales can mitigate the impacts of inefficient economies and can provide needed development funds. This in turn could help regional stability and provides for a less traumatic evolution to a market economy. However distributing energy resources remains a great challenge, and a single economically feasible Russian route is complicated by Russian economic problems. Other routes that are being considered, such as routes that run through Iran and through Afghanistan to Pakistan are considered economically or politically unfeasible at this point. Those routes run entirely through CENTCOM's area of interest. Because engagement with Central Asian states can be made much easier for CENTCOM by the development of more secure and reliable means of transporting Caspian Sea oil, energy production is an important issue for us. Energy decisions made over the next few years will play a major part in positively shaping the Caspian's future. Environmental, economical and political in turn, will help CENTCOM achieve its engagement goals.

CENTCOM's Theater Engagement Plan goals are based upon the National Security Strategy, which addresses the importance of energy resources, environmental security and efforts to promote democracy, and stability. We explained this to the Central Region Symposium last week, which was attended by

representatives from Uzbekistan and Kyrgyzstan. The White House further defines those goals as strategic engagement tasks and in turn they too become elements of CENTCOM's strategy. We would like to establish bilateral and multilateral types of engagement with the Central Asian states. In order to address the question of how to proceed, General Zinni, CENTCOM Commander, held a conference of four hundred experts who are knowledgeable of Central Asian issues, as well as Central Asian states representatives. This conference covered all of CENTCOM's area of responsibilities including Eastern Africa and Southwest Asia, and discussed important security issues and how we work together to address them. The representatives developed these results, and validated our strategy for Central Asia.

ELEMENTS OF CENTCOM STRATEGY

- Foster peaceful states
- Regional cooperation on WMD
- Drugs and terrorism
- Integrate states into international security and economic organizations
- Promote military professionalism

Most important, we discussed the Theater Engagement Plan; we told the representatives what our goals were; the responses came back, 'Yes. O.K. that sounds good.' We wanted to be transparent and allow other states to buy into our plan and as a result of our transparency we received excellent advice. For example, the representative from Kyrgyzstan stated that we should invite the Russians and the Chinese and let them talk about transparency as well. He also pointed out that when you are talking about engagement strategies, and "engagement" is translated into Russian, there is really no non-military terminology or term for that. The Russians may think we are talking about military action. Those kinds of comments are useful in our efforts to develop terminology and engagement concepts that meet the needs of the Central Asian States.

We also developed U.S. interagency awareness of our engagement strategy. Representatives from the State Department, the U.S. regional embassies and the National Security Council, as well as academics, became aware of our key issues and helped us to examine their relevance in terms of their potential contribution to Central Asian political and economic independence. We also received very sound advice on the specifics on how to develop an engagement strategy in Central Asia. We are far from being complete.

However, our engagement strategy in Central Asia is very broad and focused on developing an apolitical military. We have a number of programs to further this goal. We have an ongoing exercise in Central Asia called CENTRABATS (Central Asian Battalions). It is a peacekeeping battalion concept that we are attempting to organize with Kyrgyzstan, Kazakhstan, and Uzbekistan. This battalion concept is being considered for expansion to other Central Asian battalions. In addition, we believe defense cooperation on common environmental issues is a valuable concept for promoting regional security, and we are organizing an Environmental Security conference for central Asia and our other two sub-regions. The Environmental Security Conference is designed to develop a professional military capable of addressing regional environmental issues. General Zinni believes strongly in this professional military concept. We have other advantages when it comes to engagement in Central Asia. Because Central Asia is a high priority to CENTCOM, our program is well funded. We have another type of funding to address crisis threat reduction. It was referred to as Nunn-Luger funds, but now has been expanded to cover all of Central Asia. This allows us to engage with the Central Asians using both types of funds.

Partnership for Peace also remains an important part of our engagement with Central Asia. Four of the five Central Asian countries, are members of the Partnership for Peace program, the exception being Turkmenistan, which is supported by Warsaw Initiative Funds. We also send Central Asians to the Marshall Center.

In summary, CENTCOM does not expect a dramatic change either, economically or politically in Central Asia over the next five to ten years. However, we observe progress in Central Asia

and we want to encourage it.

SUMMARY

- Dramatic political and economic change not likely
- Interest in energy resources from Central Asia may increase

Actually that interest in energy resources may increase as the global economy recovers from its current slump and the interest might be for example, in Southeast Asia, drawing more oil out of the region and properly providing an investment for working in the region. The bottom line is as of 1 October 1998, which we are only talking about one month and one-half now CENTCOM only recently became the responsibility for the Central Asian region. Our objective is to broaden our engagement. We find that our opportunities for working with Central Asians are very good, and we have the resources to do it well. We are now really yet to developing a plan of specifically how to proceed with the input we have received from the Central Region Conference and from this conferences. We, within the Central Command, will be able to develop a strategy, which helps achieve our goal, of developing a stable democratic environment within Central Asia, apolitical militaries, and countries, which engage in a mature relationship.

Admiral Sigler's prepared remarks were delivered by LTC William Rasmussen.

MAJOR GENERAL CHARLES. J. WAX

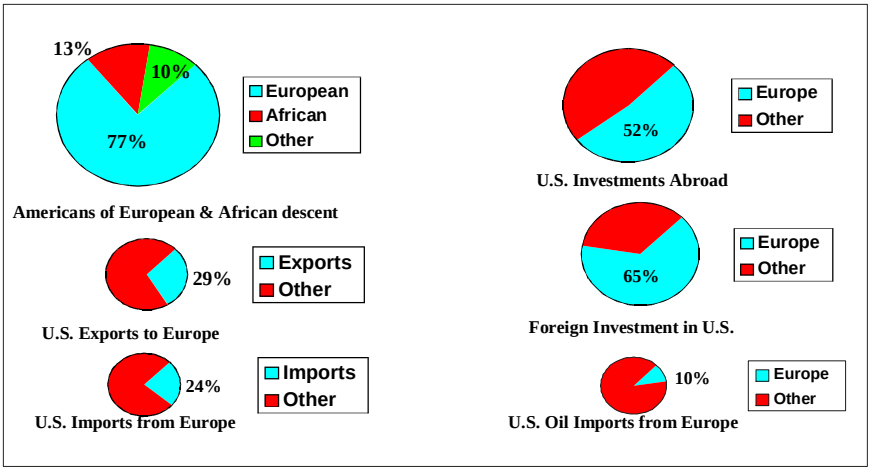
DIRECTOR OF PLANS AND PROGRAMS HEADQUARTERS, U.S. EUROPEAN COMMAND (EUCOM) STUTTGART, GERMANY

My purpose here today is to answer several questions that Mr. Bass and Mr. Vest have already raised. There are two things that Mr. Bass said is that we need to foster, communication and cooperation. That is what the spirit of this game is all about. One of the things that Mr. Vest said is that we are to engage. I'm going to describe for you through this briefing, one of the vehicles that you have today to engage, to communicate, and to cooperate with those nations of the world that are becoming increasingly important to American foreign policy and the Caspian region. Our view in Headquarters, EUCOM is slightly different than many others and the reasons for that are quite sound. We are not insulated by an Atlantic Ocean from events that are occurring, in Europe and across an entire command theater. What I intend to cover today are these events.

The Headquarters, EUCOM area of responsibility includes those nations in the Trans Caucasus region to the East of Turkey, which were added the first of October 1998.

EUCOM is one of the four regional commands for the United States military. We are involved in engagement and enlargement, part of the U.S. National Security Strategy. The size of our area of responsibility (AOR) is an unusual 13 million square miles, and running north to south, extends over seven thousand miles from Norway to South Africa. Representatives from many of the 89 countries within the AOR are present today to include some of our newest members from the Caspian region. Our AOR has 3.8 million people under arms, and 1 billion people with tremendous religious, economic, and political diversity. Of course, America's history is tied very closely to the region with many of our current and newest residents drawing their lineage from the EUCOM AOR.

Also, politically and economically we are very closely tied to Europe, and our domestic politics are similarly oriented. We are,



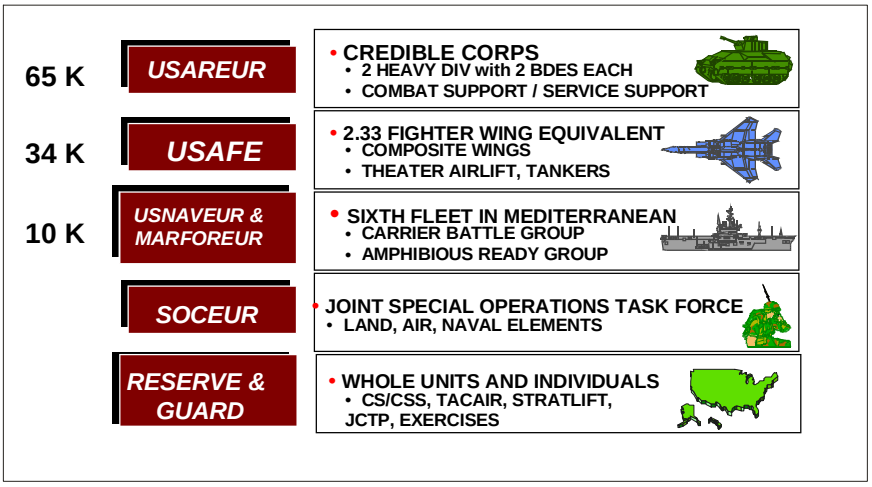
USEUCOM AOR-National Interest Factors

of course, one of the principal partners in the Trans-Atlantic security pillar, NATO that forms the basis of our political and security relationship with the entire region.

NATO will be 50 years old on April 4, 1999, and the three newest members, the Czech Republic, Hungary, and Poland, will be members by that time. It is the cornerstone of U.S. security policy in the region and has been since the end of World War II, and it has increased in importance since the conclusion of the Cold War. Of course our NATO allies are also extending their political and military relationships to influence the kinds of states that emerge from what was Central Europe, East Europe, and Eurasia in the newly independence states region. NATO assists these states in their transition from autocracy and command economies toward democracy and free market economies. The resources EUCOM has to do this are somewhat reduced but are still formidable. We have reduced U.S. forces from 314,000 troops in the European AOR in fiscal year 1990 to 109,000 today. However, we have not reduced the level of our activities. The level of engagement activity has actually increased significantly.

The requirements of current operations in both the Balkans and Northern Iraq guarantee that we will be kept busy. The new Europe is a politically complex region. As we talk about the Trans-Caucasus, the pipeline issues, and energy and environmental security, we have to think about it within the

context of the security and political relationships that exist in today's Europe. Many of those are not completely understood by Americans. The new Europe figure depicts the relationships that exist today.



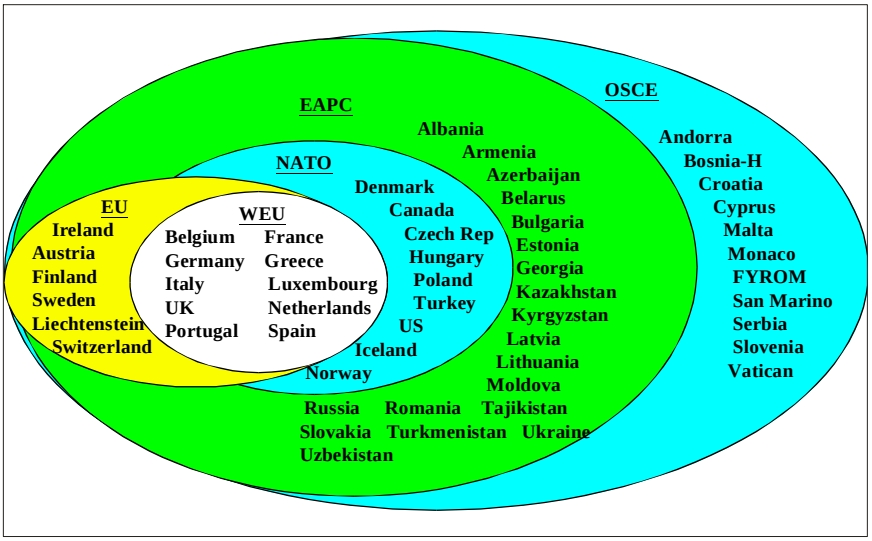
Resources: Components

These are interlocking relationships and cover a wide range of responsibilities, but they do not change U.S. interests in the Caucasus region.

There are three levels of U.S. interests in the Caucasus region. Of highest priority are our ***vital*** interests.

- Prevent reemergence of global rivalry with Russia
- Prevent and counter proliferation of Weapons of Mass Destruction
- Protect U.S. citizens and facilities in the region
- Combat terrorism and its sponsorship directed against the U.S. and its citizens
- Maintain Freedom of Access to international waterways and airways

From a EUCOM perspective, the emergence of global rivalry is the first and most important of them all. Cooperation, communication, and engagement are essential to managing these issues.



The New Europe

Our ***important*** interests are also reflected here and include the independence and territorial integrity of the newly independent states.

- Promote the independence and territorial integrity of the Newly Independent States
- Strengthen and expand positive defense relations with the Caucasus
- Assist regional response to transnational concerns including drug trafficking, terrorism, environmental disasters, natural disasters, international crime, and refugee flows
- Foster peaceful resolution of disputes and improve capabilities of countries to peacefully resolve regional conflicts
- Assist in reducing and, where possible, preventing the flow of illegal drugs to the U.S.

No one should design change to the international borders of the Caspian region without a full understanding of its historical and cultural geography. This has often been the case in this region. In order to make changes we must communicate, cooperate, and engage in issues important to the region, and deepen our understanding of the cultural and historical variables. Many of these interests are of grave national interests not only to the United States, but many of the nations in the

region, especially those that include drug trafficking terrorism, environmental disaster, natural disaster, international crime, and of course, refugees. It is important for three main tasks of our international system in the early 21st century to be addressed in the Trans-Caucasus region: the definition of what is Russia today; the accommodation of China as a political and economic power; and the prevention of weapons of mass destruction proliferation in the region.

Some other, but ***less important***, interests that we also attempt to support are:

- Support gaining or maintaining U.S. access to strategic natural resources and markets
- Develop access to facilities and other resources needed to support U.S. military operations
- Plan for response to humanitarian crisis
- Promote environmental responsibility by regional militaries

In the 20th Century the majority of conflicts were centered in Europe. The controversy of WWI challenged monarchism, left 15 million dead, and set the stage for totalitarian ideologies. The resulting conflict of WWII left 50 million dead. The defeat of the Nazis left a vacuum in Europe and encouraged the rise of the Soviet Empire, leading to the Cold War era. The collapse of communism resulted in 12 million displaced people and substantially exacerbated ethnic conflicts. The question that comes to mind is "What is next?"

We know that there have been significant changes at each of these periods of time in our history, and the collapse of legitimacy and of imperial colonial borders may be next. Ethnic and religious disputes, some will argue, are going on now. The turmoil and the conflict resulting from the transfer of refugees and internally displaced persons are highly destabilizing conditions. We are seeing evidence of regional instability in at least two regions, Iraq and the Balkans; three if one includes the Central African region. These then, are the conditions that threaten our interests; those on which we focus as we determine how we can engage, and how we can communicate with those nations within our region.

Threats To U.S. Interests

- Ideologies inimical to democracy
- Denial of access to resources
- Ethnic and religious disputes
- Regional instability
- Military threats/weapons of mass destruction
- Terrorism

EUCOM's wish is to support those fledgling democracies in their efforts to remove non-democratic ideologies through cooperation and engagement. All of these threatening conditions exist in the Caucasus and its neighbors to some degree.

The motivations for war are another area that we monitor. The variables of religious and ethnic differences, territorial disputes, environmental issues such as abuse and scarcity of resources, population growth, and WMD proliferation are often precursors to violent conflict. They also can be found within those concentric circles or ellipses in that area that we are talking about today. Addressing these issues proactively, through cooperation programs that build communication and broaden understanding, can prevent war and reduce the potential for regional instability.

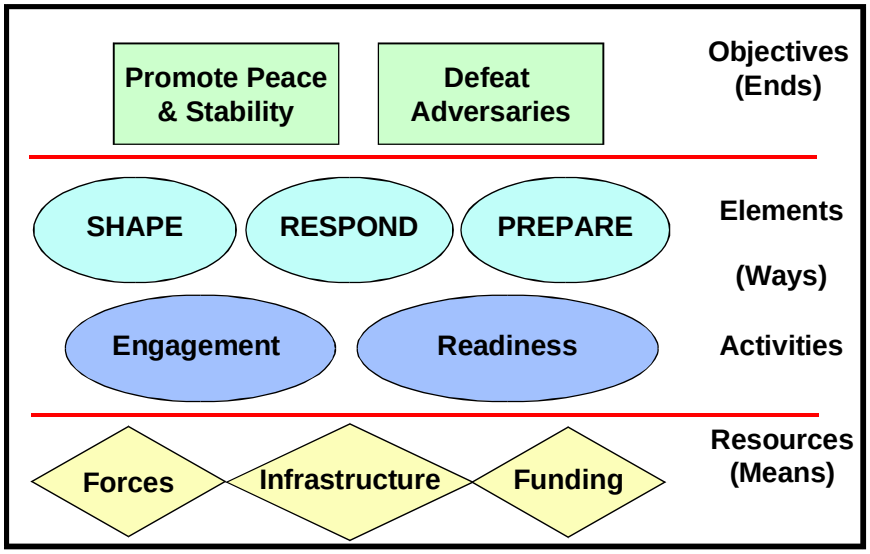
These threats are particularly troubling when they affect states that are heavily stressed by internal pressures. There are several critical variables that lead to failed states. These are the indicators that EUCOM monitors as we seek to engage with the nations within our region and our area of interest.

Falling State Variables

- Demographic pressures
- Lack of democratic practices
- Regimes of short duration
- Ruling elite divisions
- Deteriorating public services
- Severe economic distress
- Legacy of vengeance-seeking groups
- Sustained human fight

Some of these indicators are present in all of the Caucasus states and their neighbors.

The regional vision for EUCOM is "a community of free, stable, and prosperous nations acting together while respecting the dignity and rights of the individual and adhering to the principles of national sovereignty and international law." Our *theater strategy* is aimed at promoting peace and stability. It flows directly from the National Security Strategy and the National Military Strategy.



The kind of activity contemplated in Iraq now, and in the Federal Republic of Yugoslavia in October, is to conduct a vigorous program of military engagement in Europe and throughout the AOR in order to shape the international environment so that combat is not required. Our goal then for the newly independent states is to promote that stability for democratization, military professionalism, and closer relationships with NATO.

We are doing this by expanding our AOR to include the Trans-Caucasus region as well as Moldavia, Ukraine, and Belarus. It was just granted on the first of October. We presently are limited somewhat in our relationship with Azerbaijan and Armenia because of the stalemate in the Nagorno-Karabakh situation. These are the series of activities that we use as

engagement programs that are vehicles for us to communicate, cooperate, and to engage these new nations. The cornerstone in all of these is the Partnership for Peace Program (PFP).

The PFP formalizes the relationship between NATO and the rest of Europe reaching eastward. Characterized by extreme flexibility and caution, PFP is a vehicle to provide real security and a degree of military interoperability, and is a permanent and central part of the European security architecture. In addition to that, we conduct our own bilateral activities with the countries in the region, including activities within the Spirit of Partnership for Peace Programs. Twenty-seven nations are currently involved in that PFP program. All three of the Caucasus states currently participate. Starting with funding of $30 million in FY95, PFP is now a permanent program of approximately $100 million per year. Of this EUCOM receives $14 to $18 million per year to support exercises and to increase interoperability and conferences involving the U.S. and partner nations.

The PFP countries and Kazakhstan also participate in the George C. Marshall European Study Center for Security Studies. The Minister of Defense of Georgia is a graduate of the Marshall Center. We also involve our reserve component and National Guard activities and their direct relationships with partner countries. An example of this is Georgia for Georgia, which reflects a significant Georgian population in the U.S. state. Illinois, for example, is aligned with Poland, and Texas with the Czech Republic. In terms of environmental security, the Pennsylvania National Guard has worked closely with Lithuania, providing emergency response training from Pennsylvania's Three Mile Island nuclear power plant for the Ignalena power plant managers.

In summary, we believe that one cannot influence events if one is not present. That is what engagement is all about. What I described to you is the way the United States European Command involves itself in all of the nations of that region. EUCOM focuses primarily in the East and newly independent states, reaching east with NATO and the other security apparati in Europe, focusing on activities where we can communicate, cooperate, and engage.

THE CASPIAN CHALLENGE

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JOHNS HOPKINS UNIVERSITY

Amidst the euphoric predictions on the quantity and quality of Central Asian "new oil," a paramount problem remains; how to deliver it to Western and Asian markets.

The risks and rewards are tremendous; the State Department estimates that the Caspian Sea basin contains proven oil reserves of 15.6 billion barrels and possible reserves of 163 billion barrels. The potential reserves are estimated at three to four times those of the North Sea.

The major issue to be decided in bringing this petroleum to market is the eventual route of the Main Export Pipeline. The geostrategic implications of the Pipeline's routing directly involve four states: Russia, Turkey, Georgia and Iran. Whichever country is awarded the contract will exert enormous influence over not only regional economies and policies, but the global energy market.

On 12 November 1997, following a ceremony attended by Azerbaijani International Oil Consortium (AIOC) officials, Azeri President Heydar Aliev, Russian First Deputy Prime Minister Boris Nemtsov, Turkish Prime Minister Mesut Yilmaz, and U.S. Energy Secretary Frederico Pena, the first Azerbaijani oil from the offshore Chirag One field began flowing via a 24 inch, 117 mile pipeline to the newly-constructed Sangachal Terminal south of Baku, which represented a massive, US $1 billion investment by AIOC.

Given the predicted increase in Central Asian production following this auspicious beginning, transshipment via Novorossiissk can only be an interim, short-term solution, yet both the Russian government and Western oil companies are treating this route as a fait accompli. Oil exported from

Novorossiisk will have to pass through the Bosporus, Sea of Marmora, and Dardanelles by tanker, a two-hundred mile (325 km) maritime strait under the sovereign control of Turkey. Transit time under good conditions is about sixteen hours.

The Turkish government has repeatedly made it quite clear that it will not consent to a doubling or tripling of tanker traffic through the channel. There are geographical, historical, legal, and environmental precedents supporting the Turkish position.

As if to presage the increased problems involved with the passage of Azeri crude through the Straits, tanker accidents began and ended 1997. On 23 January the north-bound 12,927 ton Italian tanker *Barbarossa* collided with the Rumanian freighter *Hagieni*. Twelve months later, at 7:20 a.m. on 17 December 1997 the 18,392 ton Norwegian tanker *Orange Star*, filled with 30,000 tonnes of "early oil" ran aground at Yenikoy on the European shore of the Bosporus north of Istanbul. Turkish officials investigating the accident stated that the tanker ran aground due to powerful currents that caused the crew to lose control of the vessel. Not only are the currents strong at Yenikoy, reaching 7-8 knots, but a ship must make an eighty degree turn in the channel.

The occurrence is particularly noticeable given the fact that Norwegian-flagged tankers, which constitute the world's second-largest fleet, operate to an extremely strict safety standard. The incident was subsequently discussed at a 22 December meeting of the influential military-dominated advisory National Security Council, which included Turkey's Finance and Treasury Ministers. The NSC issued a statement noting, "A decision to bring certain previous decisions into force was taken on navigation security in the Turkish straits," but did not elaborate.

THE CURRENT SITUATION

The Bosporus and Dardanelles Straits are some of the most difficult and complex maritime channels in the world to navigate. The nineteen mile-long Bosporus has a convoluted morphological structure that requires ships to change course at least twelve times; four separate bends require turns greater than 45 degrees. At Kandilli, a blind 45 degree angle bend occurs where the channel narrows to less than half a mile. At both Kandilli and

Yenikoy, forward and rear lines of sight are blocked during turns. Adding to the natural navigational hazards are two bridges built in 1973 and 1988 that span the channel, and the Turkish government is considering building a third at Ciragan, just north of Istanbul. Navigational problems are increased by the fact that the lags of one of the two bridges is grounded in the Bosporus. Adding to the north-south international shipping congestion in the Bosporus, approximately 1,500,000 people cross the Bosporus daily on intercity ferries and shuttle boats, accounting for about 1000 east-west crossings of the channel.

The Bosporus transit numbers have been steadily increasing, reaching an average of one hundred and forty ships per day. Since 1960 foreign shipping through the channel has grown relentlessly, and its tonnage has more than quadrupled. In 1960 9,144 vessels passed the Straits. According to figures supplied to the International Maritime Organization by Turkey, 1996 total Bosporus passages numbered 49,952 vessels, of which 4,248 were tankers, an increase from 1960 figures of 546%. Russian shipping accounted for 16% of this traffic, while Turkey contributed 39% of the total tonnage. On average, about twelve tankers a day transit the Bosporus.

The Bosporus traffic is now three times greater than the Suez Canal. On average a major vessel now passes the Straits every twelve minutes. The Russian share of oil exports through the Bosporus is currently around 1 million barrels per day of the 1.4 million bpd transiting the channel. The forty-four mile long Dardanelles Strait in 1996 had 36,198 vessel transits, with a daily total of 101 ships; this number included 5,657 tankers. Petroleum shipments through the Dardanelles are at 1.6 billion barrels per day.

Shipping through the Turkish Straits will continue to increase. In addition to the growing Russian traffic via the Volga-Baltic and Volga-Don canals, the completion of the Main-Danube Canal in September 1997 will link the maritime traffic of the North and Black Sea.

This increased Bosporus traffic has also resulted in more accidents. For the last forty years, there have been an average of eleven major accidents per year. The number of accidents in the Bosporus since 1988 has steadily increased, peaking at fifty-seven in 1991. In July 1997 this congested traffic caused the

United Nations' International Maritime Organization's Maritime Safety Committee to begin preparation of a report reviewing the current Rules and Recommendations on Navigation through the Straits and the conditions in the Straits.

TANKERS AND THE STRAITS

While some commentators downplay or deride Turkish environmental concerns about tanker traffic through the Bosporus, in reality Turkish fears are well-founded. According to figures compiled by the Turkish government's chamber of Maritime Trade, the period 1990-96 saw 174 accidents in the Bosporus. Exacerbating the problem was the fact that only 19% of the vessels involved had pilots on board; only 1% of collisions occured when both ships carried pilots. For the period 1982-1990, the statistics are equally grim; 110 accidents occured, of which eighteen involved tankers from Italy, Turkey, USSR, Bulgaria, Cyprus, Liberia, and India. Fifteen of the ships were Soviet.

Tanker passage of the Straits over the years has produced a number of disasters; in 1979 the *Independenta* lost 93,000 tons of oil in the Bosporus, .8 km from Haydarpasa; in contrast, the better known *Exxon Valdez* ten years later leaked 37,000 tons of oil into Prince William Sound in Alaska. In 1979 tankers worldwide were responsible for more than 600,000 tonnes of crude leaking into the marine environment.

On 14 March 1994 the 66,822 tonne Cypriot tanker *Nassia*, laden with Novorossiisk oil collided with the Cypriot *Ship Broker* at the Black Sea entrance to the Bosporus. In the conflagration that followed, twenty-nine of the *Nassia's* mariners died. Three of the *Nassia's* ten port and center tanks containing 19 million gallons of crude were ruptured, polluting the Bosporus; the tanker was towed into the Black Sea where the fire was extinguished. The *Shipbroker* grounded in the Bosporus, with its superstructure completely burnt; only three of its crew of twenty-six survived. Both ships were total losses, costing their insurers nearly $13 million The Bosporus was closed to shipping for several days, causing eighty vessels to be stranded. The accident caused $1 billion in damages, and the Turks closed the Bosporus for a week.

Turkey subsequently announced that new regulations on Straits passage would come into effect on 1 July 1994; the

proposed regulations were subsequently approved on 25 May by the International Maritime Organization of the United Nations, despite protests from Bulgaria, Romania, Greece, Dubai, the Greek portion of Cyprus, and Russia.

The new regulations consisted of fifty-nine articles. “Large vessels” were defined as being 150 meters or more in length. Petroleum, defined as a “dangerous” cargo by the IMO, was regulated by Article 30 to be transported according to IMO regulations.

For Russia, the most ominous article in their proposed increase in tanker traffic was Article 42, which stated, “When a large vessel with dangerous cargo enters the Istanbul Strait [Bosporus] another vessel with the same qualification shall not be permitted to enter until she clears out of the Strait.” Article 54 imposed a similar condition on the Dardanelles. Given that Article 17 restricts the “normal” passage speed to 10 knots and that the Bosporus is nineteen miles in length and the Dardanelles fifty-nine, a single tanker transit could tie up passage for more than two hours in the Bosporus and six hours in the Dardanelles.

The effects of the new restrictions on Russian shipping through the Straits was quickly felt. On 15 May 1996, Russia’s Fuel and Energy Minister, Iurii Shafranik, told ITAR-TASS that Turkey could not unilaterally change the 1936 Montreaux Convention; as for Turkish converns about safety issues regarding Straits passage, Shafranik stated that these could best be addressed by forming an international commission to study the situation. Three months later Leonid Manzhosin, an official at the Russian Consulate in Istanbul, stated that delays caused by the new regulations cost Russia $300-350,000 in fines during the previous seven months.

According to Article 2 of the Montreaux Convention, merchantmen are guaranteed complete freedom of transit and navigation. This has not been superceded by the 1982 Law of the Sea Convention, whose Artricle 36(c) provides that its transit passage articles do not affect “the legal regime in straits in which passage is regulated in whole or part by long-standing international conventions in force specifically relating to such straits.”

If the projected AIOC annual output figure of 36,000,000 tonnes by 2010 is taken as a benchmark, then 2,920 additional

Bosporus passages by medium-sized 25,000 tonne tankers would be needed, increasing the daily number of tankers in the Straits by 75%. If 100,000 tonne tankers were used, nearly two passages daily would be required, with all the disruption of other maritime traffic that would ensue. In contrast, world tanker traffic in 1996 increased 2.4%.

Further pressure on the Straits will also come from Kazakh-Tengiz oilfield, the single largest oil field to come on line worldwide during the last twenty years. Following the pipeline's completion, 28 million tonnes of crude would be shipped annually. The second phase of the project would increase the pipeline's capacity to 67 million tonnes a year.

The first tanker load of Tengiz crude is scheduled for loading at Novorossiisk in September 1999. Richard H. Matzke, Chevron's president, stated that the Chevron-Tengiz joint venture was "on track" to achieve an annual output of more than 30 million tonnes by 2010.

Should the AIOC and CPC second-stage projections be accurate, then the next twelve years would see an increase in tanker passage of the Straits of 321%, as regional oil shipments would increase by 103 million tonnes per year.

TANKER DESIGN AND ACCIDENTS

Such an increase in the volume of tanker traffic would inevitably increase the risk of accident. A tripling of the tanker trade in the Straits would put mariners under greatly increased stress, which could increase the possibility of accidents. Nineteen of the largest twenty tanker spills in history were not caused by old ships, but rather, human error, usually atrributable to the combined actions of everyone from senior management down to the most junior seamen, rather than a single individual.

A further variable affecting safety is the size of the tankers that would transport the Caspian crude; as larger ships are more economical to operate, it is likely that those shipping Central Asian crude would want to operate larger vessels. Chevron officials told conference attendees that the Kazakh-Tengiz field's output alone could add daily a 150,000 tonne tanker to the Strait's traffic.

An increase in tanker tonnage in the Straits would present new challenges to crews of large tankers; few crews of such vessels have had any experience manuvering there, as very few large tankers have ever passed the Straits. During the period 1994-1997, only seven ships of 100,000 tonnes have transited the Straits, which were closed to all other shipping during their passages. Ironically, it was post-WWII instability on narrow waterways in the Middle East that led to the development of ever larger tankers.

The Middle East Suez crisis of 1956 which closed both the Suez Canal and Mediterranean pipelines provided the initial impetus to build larger ships; a decade later, 300,000 tonne tankers were poised to enter the world's shipping lanes. The 1967 and 1973 Arab-Israeli wars further spurred the development of ULCCs (Ultra Large Crude Carriers); again faced with the closure of the Suez Canal, these massive ships provided the only economical means of oceanic bulk petroleum transport by sea. By the late 1970s plans were on the drawing boards for an 800,000 tonne ULCC. The largest ULCC currently afloat is the 1502 ft. long, 226 ft. wide 564,650dwt Norwegian-registry *Jahre Viking,* built in 1976.

Tanker design and age are also factors in safety. While tankers of 5,000 dwt or greater ordered after 6 July 1993 are to be fitted either with double hulls or IMO-approved alternative designs, the world's tanker fleet, the bulk of which was built in the 1970s, is steadily aging; the average age of a tanker now is 18 years, and shipping statistics show a direct correlation between age and accident rate. According to statistics compiled by the Institute of London Underwriters, of the 95 vessels lost at sea in 1995, 76 were fifteen or more years old, 80% of total losses. Nine of the sunken ships were tankers. During the period 1990-1994, 97 bulk carriers sank worldwide, with a loss of 532 mariners. Most were older than fifteen years, and nearly half the accidents were blamed on structural fatigue and/or bad weather. During the period January-June 1996, eleven tankers foundered.

In a drive to maximise profits, many tanker owners are pushing their hulls to the IMO's 30-year drop-dead limit as stated in the 1992 amendments to MARPOL 73/78.

This has produced controversy within the tanker community. Robert Knutzen, president of the UK-based Golden Ocean Group,

speaking at the Second Annual Asia-pacific Tanker Conference in mid-November 1997, strongly urged tanker owners to scrap twenty-five year-old VLCCs immediately, as, "The more of these vessels that trade, the more likely it is that there will be a major spill affecting all of them." As Golden Ocean is the world's largest operator of VLCCs, with seventeen ships in her fleet, Knutzen spoke with some authority. He further noted, "Keeping VLCCs going beyond their natural life has become something of an obsession and it has, in certain cases, resulted in clouded judgement. It is time to do the right thing."

According to Lloyd's Register's statistics, 32% of the 9,300,000 gross tonnes deleted from the world fleet in 1996 were oil tankers, whose average age was twenty-six years. By 2001 about 170 VLCCs of the current fleet total of 440 will reach 25 years of age. About 68 VLCCs are currently on order to be delivered by 2000, which will increase the percentage of elderly operating ships.

Despite these problems associated with an aging tanker fleet, only seven VLCCs were scrapped during the first six months of 1996; it is estimated that some 1970s-built VLCCs will still be trading in 2001. As poorer operators tend to acquire older vessels due to their lower cost, the fiscal constraints that led to their purchase can also have a negative impact on their maintainence, putting the vessels at higher risk.

At present only a few hundred of the world's 3,500 tankers have double hulls. While double-hulled tankers will gradually replace single-hulled ones due to the IMO regulations, the new tankers have their own technological intricacies which could well have a negative impact on safety considerations. One specialist has noted, "Double hull tankers inherently have greater structural complexity...relative to their single hulled predecessors." American Bureau of Shipping regulations provide a corrosion allowance of approximately 0.1mm per year, which offers a typical structural element a twenty-year life span. In October 1997, however, the ABS issued a "Safenet Advisory" which stated that corrosion rates of 0.16mm-0.24mm had been found on some double-hulled tankers less than three years old; one VLCC after two years of service had been found to have average corrison pitting in it cargo bottom plating of 2.00-3.00mm. The growing use of high-tensile steel saves fuel and allows for additional cargo but is more susceptible to corrosion and fatigue.

The corrosion is caused by sulfate-reducing bacteria (SRBs). While various options for eliminating the problem have been tested, the ABS advisory recommends bottom plating be blasted and coated with two coats of bacteria-resistant epoxy. The best time for coating the bottom of the tanks is at the building stage; after a cargo has been carried, microbes might be entrapped under the coating system, which could degrade both the epoxy and the steel plate. The ABS "considers microbial induced corrosion a subject of particular concern," and solicited information, which "...would be greatly appreciated and held as confidential." The premature aging of double-hulled tankers was highlighted during the "Ships—The Ageing Process" IMAS 97 London conference, held in October 1997.

A second, equally serious potential problem for double-hulled tankers is that the leak of oil into ballast spaces from corrosion pitting can lead to a potentially explosive air-petroleum vapour mixture forming. Double-hulled tankers larger than 5000dwt built under MARPOL 73/78 regulations are required to have up to two meters separating the two hulls; many specialists consider this design requirement increases the possibility of explosion.

Nor are mechanical and structural problems the only potential source of risk to tanker operators; software glitches resulting from the widespread practice of using two digits to represent the final two figures of a year in computer databases, software and hardware chips, the so-called "Millenium Bug," will impact on the operation of tankers. A recent audit of fifty vessels of Shell International Trading and Shipping Co.'s tanker fleet found software problems with 20% of the ships' onboard automation systems, including radar mapping systems, engine control monitors, engine vibration monitors, cargo loading computers, ballast monitors, and real time engine performance monitoring.

Despite these problems, many tanker owners are opposed to further regulation. At a shipping conference in Athens in autumn 1997, Drago Rauta, technical manager of the Oslo-based International Association of Independent Tanker Owners (Intertanko), called for a halt to new international shipping regulations. "This should not be seen as a criticism of the International Maritime Ogranization, classification societies and others entities...[but] in the last seven years, the shipping legislative system has produced so many new regulations that it

would have been unimaginable 10 years ago. The sad part of this is that many of these regulations were issued just for the sake of producing them."

Instead of further regulation, many tanker owners believe that implementation of the International Safety Management (ISM) Code in mid-1998 will be sufficient. Richard du Moulin, chairman of Intertanko has stated, "ISM covers, we think, the entire safety picture...So what is most important is to make sure ISM happens on time and that ISM is strict." Referring to Japanese news reports that the age of the vessel might have contributed to the *Nakhodka's* sinking, Moulin commented that age alone should not be a criteria for judging a ship's seaworthiness. Japanese Transport Ministry underwater tests on the bow of the sunken Russian tanker found that some areas had corroded to a third of the plates' original thickness, leaving only 7mm of steel.

Moulin's optimism is not shared by international agencies. The IMO in a survey released in November on the world's twenty-five largest flag states' ships estimates that of the vessels subject to the ISM's first round deadline of 1 July 1998, almost one ship in three will fail to reach the ISM Code standard.

CHECHNYA AND PIPELINE SECURITY ISSUES

Security considerations of Central Asian crude pumped via Novorossiisk involve not only eventual tanker passage of the Turkish Straits, but the question of the security of the Baku-Novorossiisk pipeline itself.

In the chaos of the breakup of the Soviet Union, pipeline facilities were frequently targeted for attack. In January-February 1994 alone, during the Armenian-Azeri conflict, the gas pipeline to Armenia via Georgia was blown up twice. Along with the attacks and the embargoing by Azerbaijan of two natural-gas pipelines from Turkmenistan, Armenia's energy supplies dropped 80%. In February and March 1996, the Baku-Stavropol gas pipeline transiting Chechnya was blown up three times, while an explosion on the Azeri-North Ossetia oil pipeline in the Daghestani region of Derbent interrupted 25% of the region's oil deliveries.

While pipeline sabotage is an everpresent concern throughout the Caucasus, the most vulnerable section of the Novorossiisk-Baku pipeline is the ninety-two mile section that traverses war-ravaged Chechnya, where more than two years of fighting left 80,000 dead and 240,000 wounded. The prewar population of the region was about 1,100,000, of whom 66% were ethnic Chechens with Russian making up 25% of the remainder.

Among the many realities of the "northern" route for Central Asian oil is the ongoing legacy of the war on Chechnya and its oil industry. According to official figures, unemployment in the region stands at nearly 90%. Accordingly, many Chechens are involved in illegal refining of petroleum from idle wells and tapping of the pipeline itself; Chechen officials estimate that up to 25% of the province's population may be involved.

The scale of the thefts is not insignificant. Khozh Akhmed Iarikhanov, director of Yunko noted, "If we took the 4,000 tonnes a day that the bootleggers are stealing from the wells, we could solve our economic problems...This is the very greatest evil in the republic." Chechnya's President, Aslan Maskhadov, also sees the diversions as a major problem, noting, "...the theft of oil within Chechnya has reached huge proportions...Every month criminal groups are siphoning off oil to the tune of three to five billion rubles."

Russia, in its turn, has used the finances generated by the pipeline as a bargaining chip with the Chechen leadership. Yeltsin's former national security adviser, Aleksandr Lebed, suggested in an interview with Komsomolskaia Pravda in November 1996, "If the pipeline goes to Novorossiisk, the rehabilitation of the Chechen economy is quaranteed in six months. Boris Nemtsov observed during a visit to Petrozavodsk in October 1997, "If the Chechens behave, oil will be transported through Chechnya, and if they act as usual, it will go bypassing Chechnya."

Nemtsov was under no illusions about the importance of an early deal with Chechnya regarding the pipeline for early oil. Nemtsov commented on the transit agreement in a July 1997 interview with ORT Russian Public Television, "It is extremely important for us. If we hadn't done that, then Caspian oil could have gone through Georgia or south through Turkey. We would have lost trillions of rubles and thousands of jobs."

The transit fees are desperately needed to restore the shattered Chechen economy. Russian Ministry of the Economy officials estimate that total allocations needed could reach 1.7-2.3 trillion rubles, with repairs to the region's oil and gas industry costing an additional 800 billion rubles.

Russia made clear its intention to protect its investment. First Deputy Prime Minister Oleg Soskovets, appointed to oversee the restoration of the Chechen economy, stated that the Chechen oil and gas industry would remain state-owned for the immediate future. The minister also noted that Lukoil expressed interest in restoring the region's installations.

The reality of the time needed for the pipeline repairs was different from the earlier optimistic assessments of thirty to forty days. Iarikhanov later observed, "There was a lot more work than was earlier supposed." Bomb and shell explosions had produced many more breaks and deformations in the pipeline than had originally been expected. To safeguard its facility, Security Council Secretary Ivan Rybkin subsequently stated that the Russian federal government would initially guard the repaired Chechen pipeline segment with a battalion of 400 men, divided into mobile units.

Security of oil facilities and personnel continue to be a major problem in Chechnya. On 13 December 1997 Chechen Interior Ministry forces freed Semen Elizarov, chief engineer of Chechnya's Grozneft Oil Co. from captivity; he had been held hostage by kidnappers since 20 October. The same day as Elizarov's liberation, seven Chechen policemen were killed when an oil smuggler ran them down at a roadblock.

Nor is the violence directed solely at law enforcement officials, businessmen and workers; Salman Raduev, a maverick Chechen military leader formerly in the Chechen government, stated in mid-December that Yeltsin had been sentenced to death, an ominous warning, given that Yeltsin has stated his intention to visit Chechnya in January 1998.

The Baku-Groznyi pipeline has a throughput of 180,000 barrels per day, while the Groznyi-Novorossiisk section has a planned throughput of 300,000 barrels per day, which could generate an annual output of 21 million tonnes per year.

RUSSIAN STRATEGIC INTENTIONS

It is clear that Russia expects to profit greatly from an increased oil traffic through Novorossiisk. Lukoil, Rosneft, and Eastern Oil have all transported their oil through Novorossiisk, Russia's largest maritime oil transshipment facility. In 1993 Novorossiisk accounted for 27,200,000 tonnes of Russia's 50 million tonnes of oil exported by sea; by 1994 Novorossiisk exports had risen slightly to 28.9 million tonnes of Russia's total 54.3 million tonnes of crude exports. In 1996 Novorossiisk exports were running at 680,000 barrels per day, the port's highest rate since 1990.

Novorossiisk is one of Russia's largest export ports; of the 2.5 million tonnes of export cargo awaiting onward shipment as of 1 January 1996, Novorossiisk accounted for 337,000 tonnes. The port is divided into five sectors; three dry cargo handling areas, the Sheskharis oil terminal, and a passanger terminal. The port currently has a total of thirty quays and an annual handling capacity of 40 million tonnes of cargo year-round, except when weather closes the port.

On 7 December 1996 the French company Bouygies Offshore announced the finalization with Orenburg Oil Co. (Onako) of a $63 million contract to double the oil-handling capacity of the Novorossiisk Sheskharis oil terminal, doubling its capcity to 30 million tonnes per year. The Novorossiisk-Baku pipeline currently has a capacity of 100,000 barrels per day.

According to Interfax, not only will a second oil terminal be built at Novorossiisk, but the port is slated to become Russia's biggest grain and container handling port during the next three years. The grain facilities will be upgraded to handle about 3 million tonnes per year, while the planned container terminal will have a capacity of 120,000 containers per year.

Russian authorities clearly expect Novorossiisk to be the main transshipment point for Caspian oil for a long time; accordingly, the infrastructure utilizing the port is also being upgraded. On 13 February 1996 Finansovie Izvestiia reported that a consortium of thirteen foreign banks had agreed to loan Novorossiisk Steamship (Novoship), Russia's largest tanker fleet company, $225 million to buy twelve 40,000dwt double-hulled tankers to be built in the Trogir, 3 May, Split, and Uljanik

shipyards in Croatia. The orders represented a major revival for Uljanik. The tankers would be registered under the Liberian flag. Novoship in June 1997 took delivery of the last of the twelve, the 40,500dwt *Tomsk.* Novoship's President, Leonid Loza, was sufficiently impressed with the Croatian work that his firm ordered an addtional four 17,500dwt chemical and products tankers.

Novoship did not restrict itself to smaller-class vessels; on 7 November 1997 it was announced that the company had ordered six 106,000 tonne double-hull tankers from NKK Corp., to be built in Japan between November 1998 and 2000. The tankers' tonnage puts them in the Aframax category, a first for Novoship. The tankers are to sail between Novorossiisk and Europe.

The tanker orders represent a major commitment of resources to the port's future; to put this order in a Russian perspective, the moribund shipyards of the Russian Federation built sixteen ships in 1995. Novoship's ninety tankers already make it the seventh largest oil shipping company in the world. As the company is the only martime transporter of liquid products in Central and Western Russia, it has a virtual monopoly on crude oil and petroleum transport. Novoship has decided to concentrate on the tanker sector, labelling its collection of general cargo vessels "bits and pieces." To avoid the uncertainties of the Russian legal system and European fiscal worries over the non-enforceability of mortgages, the new tankers will be under the jurisdiction of the company's London subsidiary, Novoship (UK).

The Russian government clearly expects that the ultimate AIOC decision for the Main Export Pipeline will favor Russia. While in Baku for the Chirag One production ceremonies, Nemtsov declared that there was a "100 percent chance" that the Main Export Pipeline would run across Russian territory to Novorossiisk. Nemtsov told reporters that Russia would act aggressively to secure a Russian pipeline routing, possibly by undercutting transshipment prices offered by other countries terminal facilities.

Nemtsov saw the choice of Novorossiisk as the initial conveyance hub for new oil merely as a prelude to the larger Main Export Pipeline contract, stating, "We need to win the right to transport main Caspian oil against international

competition...We have won the first round with early Azeri oil passing through Russia, but that is only the beginning."

The Russian government believes that it has two arguments in its favour for winning the Main Export Pipeline contract: AIOC's initial "new oil" output is running through Transsneft's existing network to Novorossiisk, and secondly, upgrading this network to Novorossiisk as the Main Export Pipeline would be AIOC's cheapest option.

THE MAIN EXPORT PIPELINE

The potential financial profit of a Main Export Pipeline transiting Russian territory to the revenue-starved Russian government would be tremendous. Russia's Transneft is currently receiving $15.67 per tonne in transit fees from AIOC for current crude throughput to Novorossiisk; AIOC'eventual projected annual 36 million tonne output would generate an impressive $564,120,000 for Transneft. The addition of Tengiz' Phase Two 67 million tonne annual production to AIOC's output at the current tariff rate would enrich the Russian exchequer to the tune of $1,614,010,000 a year. Oil and gas currently earn nearly half the Russian Federation's export revenues; as AIOC investors would underwite the construction of the Main Export Pipeline, Russia would receive this supplemental windfall with minimal investment.

Nor would this necessarily be all; AIOC's steering committee has already approved a comprehensive study to evaluate a pipeline with a capacity of up to 1.2 billion barrels per day.

A final AIOC decision in favour of Novorossiisk has a number of potentially negative variables. Aside from security, safety, or transit considerations, a Russian-controlled pipeline would be subject to unilateral Russian action which could interfere with or even halt the flow. In 1993 Russia limited Kazakh shipments from Tengiz; the reason given was that the crude contained unacceptably high levels of corrosive hydrogen sulphide compounds (mercaptans). Chevron was forced to construct a plant to remove mercaptans before their crude was allowed in the Transneft network.

Russian economic disagreements with neighbouring states could also impact oil flow; on 1 January 1996 Russia temporarily

halted throughput in the 1.2 million barrel per day Druzhba pipeline after Ukraine unilaterally imposed a 13% transit tariff increase. The pipeline supplies about 50,000 tonnes per day to Hungary, the Czech Republic, and Slovakia.

Russia has already used its monopoly of the "early oil" route in an attempt to extract further concessions from Azerbaijan. In April 1997 Socar disclosed that Transneft had been pushing for higher transit fees for transporting Azeri-extracted oil to Novorossiisk, claiming that existing agreements between Baku and Moscow only covered the output of Azeri-international joint ventures, not oil produced solely by Azerbaijan.

Russian governmental retention of control of Transneft will exact a price on producers of Central Asian oil beyond political considerations. The inefficiency of Transneft's monopoly is admitted even by the government. Aleksei Iablokov, Chairman of the Russian Federation's Interdepartmental Commission for Environmental Security, stated on 19 February 1996 that more than 5,000,000 tonnes of oil are "lost" each year in Transneft's pipelines. While some of it may be criminally diverted, a large part of the loss is due to leakage, which Iablokov attributes to the 1% of operating costs spent on maintenance and improvements in Russia, versus the 15% spent by Western companies. This lack of attention to a deteriorating infrastructure has on occassion resulted in serious accidents, such as the October 1994 100,000 ton pipeline oil spill at Usinsk. Given these considerations, the maintenance costs for a Baku-Novorossiisk pipeline could well be mutiples of what Western companies are used to.

This deterioration due to funding shortages is indicative of Russia's energy sector in general; on 18 March 1997, Vitali Bushuev, Deputy Minister of Fuel and Energy said that the entire Russian energy industry needed to replace 50-70% of its equipment that has reached the end of its working life.

The relationship between Transneft and Socar remains rocky. Socar has stated that Transneft is to provide full service from Baku to Novorossiisk. If Transneft is unable to provide complete service on time, then Socar and AIOC expect Transneft to provide alternative service at its own expense.

THE FUTURE

The economic realities of the exploitation of Central Asian oil have drawn the closest attention not only of regional governments but the American government and officials as well. Former Defense Secretary Caspar Weinberger has argued that U.S. access to Caspian oil is more significant to long-term American strategic interests than the expansion of NATO, while Zbigniew Brezinski argued in Foreign Affairs that the importance of the oil assets of the region should cause the United States of reassess its policies towards the containment and isolation of Iran, given the potential benefits of a trans-Iranian pipeline.

Assuming that issues of pipeline security and transit fees are settled, there remain the geophyscial-strategic realities of Black Sea-Mediterranean transit. Turkey's government at all levels has repeatedly made clear its opposition to greatly increasing the passage of oil through the Straits, currently at about 32 million tonnes annually, about 25-30% of the Straits' total. Mithat Rende, Turkey's representative to the IMO has remarked, "Freedom of passage does not mean uncontrolled passage." Turkish President Suleyman Demiral stated, "The party that tries to increase the load on the straits excessively will find its tankers stacking up at the entrance of these straits." Husnu Dogan, Turkey's Energy Minister, has stated that annual oil traffic in the Straits could be raised by an additional 20% to a maximum of 37 million tonnes.

Even this modest increase would cause difficulties; Ahmet Banguoglu of the Turkish Foreign Ministry noted that this volume of oil traffic would close the Bosporus "for eight hours almost every day...The Turkish straits can't be used as if it were a pipeline for the transpsortation of Caspian oil to the West." In contrast to these stark figures, some Western oil industry officials hope for an annual transit of up to 109.5 million tonnes through the Straits, which would represent a 340% increase. It is either Western naivity or a belief in the power of money that causes Western governments and companies to ignore the consistency of the Turkish position.

Turkey has utilised both environmental and legal arguements to support its claims to restrict Bosporus shipping, and has indicted that even further restrictions are possible.

During a visit to Rome in autumn 1997, Turkish Foreign Minister Ismail Cem reiterated the Turkish position, stating, "A Turkish citizen's life is as valuable as the life of an American citizen. We will implement measures taken in the U.S. The U.S. does not allow oil tankers without double reinforcement to come within 120 miles of its continental shelves. In contrast, in Turkey, we are discussing whether or not to let tankers pass by our houses." Tankers at the narrowest points of the Straits pass to within 100-200 metres of densely populated areas.

Finally, Turkey has also raised the economic cost of maritime transport; on 16 November 1997 Cem told the Turkish Parliament during its 1998 fiscal year budget discussions that shipping crude via the Straits "will not be as cheap as it is thought."

Assuming that the Black Sea transshipment route remains the de facto route for tanker traffic, the situation is complicated by the possible outbreak of maritime conflict in the region. The Montreaux Convention would severely restrict the tonnage and type of forces that non-Black Sea powers could project into the region to protect their shipping. While the United States is not a signatory to the Convention, it has historically always complied with its provision. Furthermore, Russian maritime law could potentially prevent the approach of foreign warships within Russian territorial waters, as the Law of the State Border of the USSR of 24 November 1982 remains technically in force, allowing the right of innocent passage only with the prior consent of the Council of Ministers.

The 1980-88 Iran-Iraq war provided a grim example of attacks directed against tankers. Attacks on tankers began in May 1981 by Iraq, which declared Iranian ports to be war zones, in which neutral shipping could be subject to attack. Iraqi attacks outnumbered Iranian ones by three to one. In November 1983 Iraq declared a 700 mile war zone from the Shatt al-Arab to Bushire, and expanded its attacks on Gulf shipping. By May 1984 the tanker attacks were an international crisis, as Iranian warplanes attacked neutral shipping throughout the Gulf; Iranian oil exports from Kharg had been cut in half, insurance for tankers entering the Gulf had risen sharply. In 1984, during the first nine months of the "tanker war," forty-four ships, including Kuwaiti, Saudi, Iranian, and Iraqi vessels were subjected to air attack or damaged by mines. Japan banned its tankers from

Iran's Kharg Island terminal until the Iranian government provided special incentives to compensate them for the risk involved. The Reagan administration decided to re-flag Kuwaiti tankers and escort them through the war zone; Deputy Secretary for Defense William H. Taft IV stated that the American government considered, "...the...continued flow of oil through the Strait of Hormuz and freedom of navigation in the Persian Gulf as interests of vital importance."

The scale of the attacks on neutral shipping was high: Iran alone attacked 126 ships during the period 1981-1988, while Iraqi missile attacks in August 1986 damaged thirteen tankers. Between the Iran-Iraq War and Desert Storm, nearly 200 ships were sunk in the Persian Gulf, producing environmental and navigational hazards.

Within the Caspian itself, foreign powers could do nothing if Russia chose to exercise its maritime muscle. Using the Don-Volga canal, Russia could transfer significant amounts of its Black Sea forces to the region to intimidate the oil producers. As one senior international official in Baku noted, "They could destabilize the political situation, or raise the issue of the status of the Caspian. The nightmare scenario is for them to send their fleet to the rigs, claiming that the Caspian is a lake and the resources should be jointly developed."

CONCLUSIONS

There is no doubt that the Turks are serious about their opposition to increased tanker traffic through the Straits. The Turkish strategy that seems to be developing is based on environmentally restrictive foreign practices; Turkey's Foreign Minister recently announced that the nation was looking at revising its laws regarding petroleum transit through its territorial waters, using the U.S. example, whose 1990 U.S. Oil Pollution Act (OPA) prohibits oil tankers without double hulls from a declared 200 mile economic zone. Given the current paucity of double-hulled tankers in the world fleet, such a restriction would place a severe burden on shipping companies wishing to exploit the Central Asian bonanza.

What should not be forgotten in the debate about increased tanker passage of the Straits is the fact that, while the Bosporus and Dardanelles are waterways whose civilian and military

passage is regulated by international treaty, the Straits are also for Turkey an internal waterway; 39% of the shipping there is Turkish. It is most unlikely that the Turks will agree to a severe disruption or complete suspension of this traffic in order to meet the transport needs of the Seven Sisters.

AIOC and Aliev will be under myriad, intense pressures from competing interests as they reach their final decision for the route of the Main Export Pipeline. In the end the decisions about pipeline routes will be made not by governments, but by the oil companies and other private firms which will invest in the projects. Governmental policies, however, will have major and ongoing impact on the operation and profitability of pipelines and oil.

CHAPTER IV

PRESENTATIONS BY COUNTRY REPRESENTATIVES

KAZAKHSTAN

FIRST SECRETARY ASKAR TAZHIYEV

It is an honor to speak before the distinguished participants today. To explain to the audience why I have the responsibility to be here; I should mention that Mr. Galief and our Deputy Chief, could not attend this important event, so the pleasure is mine. The seminar's agenda gives us the opportunity to address a variety of issues related to the context of the exploration and transportation of energy resources in the Caspian Basin. The increasing number and scale of the immediate and long term tasks in the Caspian underline the necessity and importance of such an international meeting. This context involves critical issues such as energy, environment, culture, and other aspects that are complicated by the different levels of the social and economic development of countries concerned and in policies they pursue.

Nevertheless, it is common, clear, and imperative for littoral states to promote regional stability and to develop friendly relations between all states. It is obvious that there needs to be a common understanding of the challenges that regional states face in the so-called age of uncertainty and that they then join forces to cope with them, for they are all of vital importance. At the same time, the task of maintaining the balance between national interests and compromises sometimes needed to achieve the above-mentioned goals is a challenge itself. A number of issues affecting this subject, such as geopolitical, economic, environmental, demographic, military, and so on, were studied by the think-tanks of governmental and private institutions of western countries. While representing the best examples of

studying national security interests in various stages, this research sometimes gives advice regarding economic and political development in the developing countries and countries in transition. Quite understandably, this advice is not always in full compliance with the agenda of these countries. During the last several years, Kazakhstan was involved in the pursuit of two main strategic goals. These are strengthening our current independent state, and implementing a broad scale social, political, and economic transformation.

In 1997 we reached a stage of stabilization which gave our leadership a chance to comprehend where we had been. This chance was effectively used to develop national short, medium, and long-term priorities. It is the first dictum among the countries of the former USSR to utilize the international experience of nation building while at the same time taking the country out of this changing environment and into the world. The Caspian Sea agenda should be considered among other concepts to be discussed at this seminar today.

Our long-term priorities are national security, domestic/political stability, and improving the conditions of our society through economic growth based on a developed market economy with a high level of foreign investment. I think I should elaborate on the energy resources environmental issues as far as they are current topics in today's discussions. Comparing the ranking of the top ten oil-extracting nations, Kazakhstan has had serious problems satisfying its internal demand for a number of years. It is a result of the system of distribution and a lack of the required infrastructure, which goes back to the Soviet era. Similarly, our shortage of the transportation required for exporting oil and natural gas to the world sharply reduces our opportunity to recover sufficient resources for the realization for our development programs. Our strategy of refining resources through regionalization includes the following components. First, we are in search of partners for long-term cooperation whose challenges coincide with our challenges.

In contracts we strictly and reasonably stand for interest of Kazakhstan, particularly with regard to environment protection, employment, labor training, and the resolution of social tasks. We greatly appreciate our current partners operating in our part of the Caspian Sea to accomplish these tasks. At the same time it is overlooked sometimes while concluding oil and gas contracts and

sub-contracts. Companies involved in exploration activity in the region are reluctant to take responsibility for the potential political damage caused by, for example, the level of the Caspian Sea. This is a matter that could be a national disaster. But, this phenomenon hardly can be compared to tornadoes, earthquakes, or other unpredictable natural phenomenon. The monitoring process has been conducted since 1833 and different international organizations including the United Nations and other institutions are helping to resolve this problem and reduce the cost of preventative measures of the regional states against the raising water level.

With regard to our national resources, we are interested in completing agreements with you which will correspond to the best world practices and will meet Kazakhstan's interests. The second part of our energy strategy is the development of a system of pipelines for oil and natural gas exports. Only a multiple system of export routes can prevent our dependence on a single neighbor, as well as dependence on a single customer. The formal approval for 2.3 billion US dollars for a Caspian pipeline consortium is to be signed on November 21, 1998 and will make transportation for our crude to international markets a reality. As you are quite aware, the construction of this pipeline is expected to start early next year. You are quite of the statistics and I won't repeat them for you now. I should say that the President of Kazakhstan signed it providing that twenty billion cubic meters of Kazak gas would go through trans-Caspian Pipeline. We consider this project commercially viable in this case and even more so in ten years when Kazakhstan's export capacity increases. Kazakhstan plans to transport 2.5 million tons of oil to the Black Sea by Baku Supsa and additional millions are planned to be transported to the Georgian Black Sea ports by railway.

I would like to mention the latest developments in this area regarding the multiple system at work developments. Seaports are being constructed to increase capacities. To fill in the study an oil pipeline project running from west Kazakhstan to west China will be ready in March 1999. This connection called Trans Oil, now Kazak Oil, a project for construction of an oil field platform, is being developed. The construction of the platform will enlarge the range of routes for companies. Negotiations on larger handling capacities for oil pipelines continue and additional supplies will be transported near Russia. As you can

see, investments from overseas will accelerate education and development of the domestic energy infrastructure, as well as resolve the problems of self-sufficiency and competitive independence.

Again, speaking about environmental security and sustainable development, we must apply approaches in the most effective way to serve the benefits of all parties concerned. This is a necessity for a better understanding of these complex connections and ultimately for an awareness and resolution of environmental degradation in this part of the world which is becoming increasingly important for many nations. The best partners of global responsibility, mutual respect, and well being should be developed there with the help of private sector international organizations and local governments. A final example is a recent World Bank group that was a business partnership for development with private companies engaged in this new concept for sustainable development which includes partnership in exploration, war sanitation, issues of use, and others. So, though this statement is a difficult thing to guarantee, I have provided the so-called “fresh thinking” which we were encouraged to do because there is a difference between the capacity which I am representing as an official and having some limits to go beyond this. Yours is more free in terms of changing opinions, etc. I should be sorry in advance for maybe limiting my remarks in the future.

TURKEY

FIRST SECRETARY
ILNAN OZYILDIZ

I would like to particularly dwell upon the position of Turkey, one of the United States' closest allies in the region. We have displayed a special interest in developing Caspian energy resources over the past five to seven years. Turkey has several motives for developing such a policy vis-a-vis the region.

First of all, Turkey has been cooperating with the U.S. administration and the rest of the international community in general in strengthening the independence and sovereignty of the newly independent Central Asian and Caspian Basin countries. Especially after the demise of the Soviet Union, Turkey has developed a policy of assisting the newly independent states in promoting their independence and sovereignty, particularly independence in terms of energy resources. In this connection, Turkey tries to help these countries find new outlets for energy resources, a process which is instrumental in developing their economic policies and viability.

Secondly, Turkey itself is in urgent need of energy. We have a growing economy. In the first decade of the 2000s, Turkey will need some 50 billion cubic meters of gas and 45 million tons of oil and, unfortunately, it does not possess any constant resources of either gas or oil. So that means that Turkey will be a net buyer of energy products. One of the closest regions that could provide needed energy resources is certainly the Caspian Basin.

The third factor motivating the Turkish government is Turkey's growing significance in the region as a transit country, connecting the Caspian Basin to Western markets. Turkey is a NATO ally and a stable country. It possesses facilities like the Ceyhan terminal located on the Eastern Mediterranean coast which has a production capacity of 120 million tons of oil per year and is operational 365 days per year. In fact, the Ceyhan terminal has been used since the mid 1970's as the outlet for Iraqi oil. As a result, Turkey has experience operating a pipeline in a difficult

region, like the Korkuk-Yumuntalik pipeline which is managed by BOTAS, Turkey's pipeline company.

Last but not least, Turkey is motivated by environmental concerns. The Bosporus, a very narrow waterway, runs through Istanbul, a heavily populated city. Turkey has a special interest in protecting the environment and population of this large city. In promoting its energy policy, Turkey has specifically argued in favor of the Baku-Ceyhan Pipeline—which at the time is one of the leading candidates for the main oil export pipeline from the Caspian to Western markets—because it is also the most environmentally sound choice.

Turkey believes that the Baku-Ceyhan Pipeline is the most secure option for the main oil pipeline. In order to make Baku-Ceyhan commercially viable the Turkish government has been forwarding offers to various companies. Additionally, on October 29, 1998, Turkey signed a declaration with other regional countries supporting the East-West Transportation Corridor in general and Baku-Ceyhan in particular. Moreover, Turkey has been cooperating with the U.S. administration and it is Turkey's sincere desire to cooperate with the Russian Federation as well. Turkey believes that the Russian Federation or Russian companies should take part in the development of the Caspian energy resources.

In conclusion, I wish to emphasize that the Baku-Ceyhan Pipeline is very much connected to the Bosporus issue. To make navigation safer through the Bosporus, the Turkish government recently has taken new steps and implemented a new set of regulations effective November 6, 1998. In this regard, the Turkish Government is planning to join international conventions, such as the Civil Liability Convention or The Fund Convention, which would further aid to the security of the Bosporus via the application of certain litigation measures.

TURKMENISTAN

AMBASSADOR
HALIL UGUR

As you are aware, natural gas is what Turkmenistan primarily has. I would like to share with you a little bit about our natural gas story. You know that we have been exporting substantial amounts of natural gas to Europe through the Russian pipeline. However, we ran into disagreement with the Russian government by 1996 and since then we have not been exporting any of our natural gas. Last year we established a small, short pipeline to the northern-northeastern part of Iran and we are supplying a very limited amount of natural gas to them for their power stations. As far as we are concerned, there are still major markets for our natural gas. Starting from the east, China and Japan have an interest; in the south we have Pakistan and India representing a substantial market; and then Turkey and Europe are also our potential markets.

Among all of these that I have mentioned, the most effective market for us at this moment seems to be Turkey. As we recognize, Turkey is probably the fastest growing natural gas market in the world. They have a very large need for natural gas so we are primarily concerned with building outlets to reach the Turkish market. There are three possible ways to reach the Turkish market: one is through Iran; one through the Caspian region; and the third is through Russia again. One way through Russia is to increase supply through the Bulgarian pipeline that already exists. The second way is to lay another pipeline from Russia through Georgia to Turkey. So we are looking at all these possibilities. Further, two companies are doing physical studies on the first two options, the Iranian and Caspian options. We have started to look at the Caspian option very seriously and are glad to see that some of our neighbors have become very environmentally sensitive. So, the region is aware of the sensitivity of the western world to the environmental issues and these are becoming substantial issues to discuss on the pipeline routes as well.

Our government is also very sensitive on the environmental issue. In starting our feasibility studies, we made it a condition to the companies to take a very careful look at the environmental issues during the development of those projects, as well as the increase in costs and the details of those issues. This should suffice regarding Turkmenistan natural gas.

Regarding oil, we have a limited supply, or about seven million tons per year. We hope to reach approximately 25 by the year 2005. Whoever builds a pipeline, we would prefer to just go ahead and join their efforts. I don't think our production total justifies any special pipelines. We are, however, ready to cooperate on any pipelines that would need to go through Turkmenistan. There are projects to take Kazakhstan oil down south through Turkmenistan to Iran and then south, or first to Turkmenistan and to join our natural gas pipeline project and lay a pipeline through the Caspian, then on to Turkey or the Black Sea. In any event, we are ready to cooperate on those projects as well.

GEORGIA

DEPUTY FOREIGN MINISTER VALERI CHECHELASHVILI

Fundamental changes that occurred in the world in recent years once again stressed the geopolitical role of the Southern Caucasus, which I have the honor to represent.

Being an integral part of southeastern Europe, the southern Caucasus is uniquely positioned to provide linkage between developed economies and emerging markets. Georgia has already proved itself to the world community as a reliable transit country. Four hundred miles of southern Caucasus land between the Black and Caspian seas has already become an active transit space. More then seven million tons of transit cargo passed through Georgian territory in nine months in 1998, almost double the period in 1995. During the same period transportation of oil tripled to the amount of more then three million tons. This amount is estimated to increase three times in the next two years.

In particular, the unique geopolitical position of the southern Caucasus allows for the opening of a new corridor for energy resources transportation. This could serve the interests of the international community as well as develop a transport infrastructure in transit countries. An increasing demand for energy resources requires additional oil reserves and further supply diversification.

It is a well-known fact that oil reserves in the Caspian Basin are estimated between 30 and 200 billion barrels. Existing routes, although already operational, are not sufficient to provide for the transportation of such large amounts of oil.

It is not a question of whether a new route is needed, but rather where the new route should be located.

Very impressive arguments about Baku-Ceyhan have been made and I cannot provide better ones.

Moreover, the same route could potentially be used for transportation of not only Azerbaijan's oil, but also for hydrocarbons from other fields of the region - Kazakhstan, Turkmenistan, and Uzbekistan.

This issue becomes even more acute now as the same studies show that this region is to become the second largest supplier of energy resources to the world market in the 21st century. That is why it is of primary importance to ensure security and stability of the energy supplies from that region.

At the same time, due to the global nature of the project, it is vital that location of the pipeline does not become a matter of dispute between governments. Any one country should not monopolize this global issue. Rather, it should be determined on the basis of fair competition between countries' offers in terms of tariffs, taxation, incentives, and other terms.

Georgia sees itself as one of the transit countries for the new pipeline and, accordingly, the Georgian Government is taking proactive steps to create a political, legal, and institutional framework which will support the efficient operation of the regional transport network. Georgia believes this project to be a priority for the country, and for determining its place in the world market.

The Government of Georgia is taking all the necessary steps to ensure the successful implementation of the project. A favorable foreign investment climate has been created. The adoption in 1996 of the Law On Promotion and Guarantee of Investment Activity, providing for national treatment of investments, proposed accession to WTO, and successful ongoing privatization should encourage foreign investment activities in Georgia. Georgia will continue to take all appropriate measures to ensure the stability and safety of transportation via its territory.

The Georgian Government's policy towards this project and recent meetings with the governments of the U.S., Ukraine, Azerbaijan, Italy, Kazakhstan, Turkmenistan, Romania, Bulgaria, and Turkey show that all the countries mentioned see Georgia's significant role in the realization of this project.

In September, more than 32 countries and 13 international organizations participated in a key two-day conference to

formalize plans for development of a transport infrastructure along the "Silk Road" corridor. Georgia was one of twelve signatory countries to a multilateral agreement covering infrastructure development, harmonization of customs and tariffs, and various other legal and administrative points that are key to ensuring efficient international transit along the route. The transportation has already increased by an estimated 60% in two years, assisted by EU investment of about 70 million U.S. dollars (USD). In total, about 1 billion USD of investment is expected to bring down costs and transportation times, and to increase the volume of trade along the route to more than 30 million tons per year.

As Georgia's former Ambassador to Ukraine, I cannot help but mention one of the most important elements of the TRACECA project was the implementation of the railway-ferry-boat between Ukraine and Georgia, which will start operating next February and give another opportunity to increase oil transportation. Through this route other East-European countries could receive oil directly from the suppliers. In addition technical assistance provided through TRASECA has helped to attract larger investments from the IFIs that include the EBRD who have made a number of commitments for capital projects on ports, railways, and roads along the TRASECA route, totaling over 200 million USD, and from the World Bank who has made commitments for new capital projects on roads in the region totaling over 40 million USD.

The work on building infrastructure for the oil transportation project is already in process and some very practical steps have been taken. The International Oil Consortium is building the pipeline through the Georgian territory to Supsa (Georgian Black Sea port), as well as a new oil export terminal in Supsa. The works are almost complete. The first tanker is expected to leave Supsa next spring.

I would like to assure all of you that the Georgian Government will continue to take all measures to provide the most favorable conditions for the Caspian oil transportation and serve the best interests of all the parties involved.

Regional economic cooperation should contribute to the process of building up a new security network. We see the important role of western powers in this development.

In conclusion, I have the honor to express my strong belief that our meeting today will become a significant step towards our future cooperation for the execution of the “project of the century,” stable economic development of the region, and prosperity of our countries.

CHAPTER V
GAME FINDINGS

AZERBAIJAN TEAM POSITION

The Azerbaijan team initiated negotiations under the assumption that President Aliyev would only accept the Baku-Ceyhan option and that the United States unequivocally supported this route. He had stated that SOCAR was to use the conference to put together a consortium to construct the MEP and to ensure that it be operational by mid 2003 for domestic political reasons.

The President identified the following guidelines:

- *Maximize the role of the Azeri's in MEP management and executive decision making.*
- *Maximize participation and throughput agreements to achieve economies of scale in the MEP.*
- *Give priority to ensuring that the bulk of the oil the MEP carries from production areas within Azerbaijan.*
- *Minimize the risk that present and future oil production will be stranded for any length of time.*
- *Take maximum advantage of the construction and operation of an MEP to increase Azerbaijan's indigenous technological skills.*

Vital Interests and Associated Issues

The Azerbaijan Team identified key issues that affected Azeri interests and impacted on the furthering of those interests.

- *Maximize revenues for Azerbaijan*
- *Protect economic and political ties to Turkey*
- *Balance Iran and against Russia and not get into a position of choosing one over the other.*

Based on these factors, the Ceyhan route was the best choice for the MEP.

Maximizing revenues for Azerbaijan meant acceleration of production to the maximum extent possible with existing infrastructure. This would mean additional oil through the Bosporus until another route was obtained. This was a difficult sell to Turkey given their domestic situation following the accident involving the *Spirit of Africa* oil tanker.

President Aliyev had made a strong domestic commitment with respect to the Ceyhan route, and he did not want to back out of this commitment. The President believed that delivery on this promise was key to his future and legacy as the leader of Azerbaijan, and as an influence in the region. This created additional pressure not to compromise on the route.

An important Azeri interest was protecting economic and political ties with Turkey. Balancing this interest with the necessity to accelerate production from the Caspian prior to an alternative route to the Bosporus required a delicate approach and an attitude of compromise as will be discussed in the recommendation section. By supporting the Ceyhan route, the Azeri's contributed financially and politically to the Turkish regime. The tariffs from the pipeline would benefit the Turkish state, the jobs associated with installation and operation of the pipeline would benefit Turkey's poorest people, and the reduction in traffic through the Bosporus would reduce the strain on that key ecosystem as well.

Azerbaijan did not want to damage relations with either Iran or Russia. The choice of a northern or a southern route would require choosing one over the other and risk reversal of previous advances in the relations with these countries. The Azerbaijan government, recognizing the political and economic instability in Russia in addition to its crumbling infrastructure, and the perennial extremism of the Iranian regimes, did not want to risk their exports to either of these nations. Also, the number of

American companies involved in reality precluded the Iran option. This was made crystal clear to the team during discussions with the U.S. team.

Early Confusion with the U.S. Position

There was immense confusion within the Azeri team when, in the first meeting, the United States indicated that they were no longer unequivocally supporting the Baku-Ceyhan route and were looking at other options. This voided the basis for all underlying assumptions used by the Azeris who then were forced to follow a different course to the same destination. However, a deeper investigation into this apparent misunderstanding could have revealed that the other options were almost totally untenable to the U.S., with the possible exception of a Baku-Supsa option as part of a phased Baku-Ceyhan option.

Commercial Realities

It was obvious that the commercial realities prohibited early support for the Baku-Ceyhan route by the oil producers. This would definitely delay the capability to increase Azeri production unless additional throughput via the Bosporus was allowed. The position of the oil producers was plain and supportable. There is sufficient pipeline capability to transport all current oil from the Caspian and this will not change in the near future. The uncertainty of the Shazdeniz reserves and production rates also contributed to the lack of enthusiasm by the oil producers for an early commitment to Ceyhan.

However, as additional Azeri oil came on line, this oil and other early oil would need to be transported through the Bosporus.

Also, the potential of thawing relations between the U.S. and Iran provided a lower cost option with more flexibility causing the oil producers to seek to delay a decision on the more expensive Ceyhan route. While this was touted as a possibility, this likely was more of a supporting issue to the position taken by the companies due to the economics.

The Compromise with Turkey

As noted earlier, Turkey's position was that additional throughput via the Bosporus was unacceptable. They had begun a public relations campaign to emphasize the damage to the ecosystem as well as the risks associated with throughput at current expanded levels. A Bosporus bypass would have accomplished this. However, it would not have provided the associated benefit which, in all likelihood, was the primary reason for the Turkish position - the economic benefit to their poorest regions that would result from building and operating of the MEP along the Turkish section of the Baku-Ceyhan Route.

Based on the above, the Azerbaijan team, in their meeting with Turkey, proposed and reached agreement on an acceptable phased approach to the Baku-Ceyhan route. Turkey would accept quietly a short term increase in Bosporus transit providing the Azeri's the capability to ship oil coming on line. However, this would be based on, and depend upon, tangible progress toward the Baku-Ceyhan option. To improve chances of an earlier approval for the Baku-Ceyhan option, the team also encouraged commercial cooperation in the pipeline.

Winning Concurrence from Other Actors

Also, with respect to the Bosporus, it was necessary from the onset to ensure that Kazakhstan, Russian, and Azeri oil were all treated equally and that none was penalized more than another for getting to the Bosporus late. This was necessary to reduce the sting of the Baku-Ceyhan position. Also, while gas did not play a role in this particular game (it focused on oil), in reality the Azeris had a strong suspicion that it was going to play a much more important role than it was at this time.

The Azerbaijan team agreed to a Kazakhstan equity swap, shares of Shahdeniz for shares of Tengiz, but no volume guarantees were involved. This provided benefit to Kazakhstan for the early oil production that would be shipped through the Bosporus and also more benefit associated with the MEP in the early years.

As noted, there were indications of a shift in the U.S. position with respect to the Baku-Ceyhan route. Therefore, the team proposed, especially to the U.S., that we tender a project for

Baku-Ceyhan led by SOCAR and an American company of the U.S. government's choosing. This did not appear to change the U.S. position.

The team agreed in absentia for a Georgian equity swap so that they would have an equity participation for development in Azerbaijan as well as in the pipeline.

To appease Russia, an agreement was reached to double early oil through Russia with a quality bank. However, the Azeris arranged for this to be done based on existing agreements, which included no volume guarantees. The Russians also agreed to make a MEP proposal that included a Bosporus solution that did not just terminate in Novorossiiysk.

None of the countries participating had the funds to build the MEP, regardless of the route. This had to be borne by the oil producers. The western oil producers refused to commit to Baku-Ceyhan even with proven Shahdeniz volumes. Their alternative proposal was the Baku-Supsa option that would get oil to northern Turkey for consumption and would serve as the first phase of a Baku-Ceyhan line. (There were some feelings that once additional volumes were found in Azerbaijan, the Western oil producers would not be quite so adamant about the alternate plan.) The producers' position was that time was not of the essence and that waiting a year would not be a detriment and would provide another opportunity to review options as well as provide better indications of the Shahdeniz volumes.

The Eastern oil producers maintained that they wanted an equity stake in the MEP to Ceyhan, which Azerbaijan agreed to, but there were no volume commitments at that point.

It is imperative to fully understand the positions of other actors to the extent possible and to fully investigate any statements or implications that might contradict previously stated or obvious positions. An example is the misunderstanding of the U.S. position. It should have been intuitively obvious that none of the options, other than Baku-Ceyhan, would have been supportable with the possible exception of a two-phased approach. The idea that the U.S. might have 'sold out' Turkey and/or Azerbaijan seems almost unbelievable considering the other options available. Obvious potential allies must be contacted and their positions verified before negotiations between parties with certain or likely alternative positions.

Recommendations

The following recommendations were stated or implied during discussions between Azerbaijan and other teams and/or during their presentations.

1. The only actors in the arena that could afford to build the pipeline, other than the U.S. Government that would never do so, was the Western Oil Producers. The producers were driven, as they always are, by commercial realities. These realities include opportunities for capital investment in other regions as well. The strategy of Azerbaijan should have recognized and anticipated this position, and identified possible incentives to improve the early Baku-Ceyhan route. Options include:

- *Developing a sliding tariff scheme that would start tariffs at a low level and increase them with time.*
- *Develop sliding scale tariffs based on oil price.*
- *Adjust royalties in the short term, (first ten years) to encourage accelerated development of the fields and base this on a Baku-Ceyhan MEP.*

2. Turkey's position as a victim of an environmental tragedy at the hands of the oil companies could play well to the U.S. public. By exploiting this, and using the informational element of power, it could be possible to move public opinion. This was done after the *Exxon Valdez* spill in Prince William Sound (Alaska) and resulted in the decision not to open the Arctic National Wildlife Refuge to drilling. This environmental event is stamped in the minds of the American people, particularly those with an intense concern for the environment. This could be coupled with an 'alternative to the Persian Gulf.' These two themes could help the Baku-Ceyhan route gain political support in the U.S. Congress. A further boost could be provided by comparing this option with that of normalizing relations with Iran, a country Americans love to hate.

3. Providing an attractive package for the use of the loading docks at Ceyhan and minimizing the cost of these already existing facilities could provide some incentive to the potential investors in the MEP venture.

4. Finally, a combination of two or more of the above could be utilized.

There are other approaches, as well, but they are less appealing. A possible feint to imply that the deal with American companies could be revoked, reallocating the equity in the agreements to non-U.S. companies, could be used to reach agreement with Iran. This could, ultimately, backfire and result in the delay of Caspian development due to these uncertainties. Also, an attempt could be made to unite with Turkey in a hardball approach to the Bosporus problem, forcing long delays in traffic. This would result in losses for the Azeri as well and would contribute to erosion of regional security in the Black Sea area.

In the end, and under the current economic and political situation in this isolated region, Azerbaijan will have to use elements of informational, psychological, and economic power to achieve any early approval of the Baku-Ceyhan route. It is a fact that these elements of power of this fledgling country are far from overwhelming. Therefore, the skillful application of diplomacy in the immediate region, and with the countries of the foreign oil producers, will be absolutely essential if Baku-Ceyhan is to be a reality in the near time frame.

The team was less clear on where to go from there. You could ask the question of what do you say if your conversation is with Eastern producers? Is it going to be about aggravating volumes to get to Ceyhan, but the U.S. isn't going to Ceyhan anymore, and Turkey may not be either? If so, then why is Azerbaijan wasting its time with it? Why aren't we then doing something else?

We also considered the question, "wouldn't that make Iran more tempting?" It was clear that U.S. companies were still involved in Iran but that U.S.-Iran policy was not changing. So, whereas we were in agreement with swaps in smaller volumes, we did not see where U.S. companies were going to be able to be involved in a major pipeline through Iran. This was because it was clear that U.S.-Iran policy would remain unchanged.

IRANIAN TEAM POSITION

Iran felt that it had accomplished an important foreign policy objective just by being invited to the conference. We came here with a very open mind, as you will see from our opinions of the pipeline options that were submitted. After talking with the American team, we decided to embrace the U.S. concept of a multiple export scheme for the Caspian in which oil goes in all directions - east, north, west, and, in our case, south.

Iranian Goals

Iran's goals that we sought to achieve at the conference were:

- To attract as much oil as possible through the Iran route through swaps
- To maintain a high level of Iranian influence in Caspian affairs.
- To achieve Caspian demarcation that would be favorable to Iran.

Attracting Oil Through the Iran Route

To attract oil to the Iranian route, Iran realized they had to avoid any single MEP route. To do this, we had to provide alternatives that were obviously more attractive than an Main Export Pipeline, economically, politically, and environmentally, and to demonstrate that the Iranian route was, in addition to being by far the best economic option, both technically and politically satisfactory.

Avoid an Early Decision on a MEP Route

Time was on Iran's side with the warming of U.S./Iranian relations, although slowly, and the fact that an early decision would almost certainly be contrary to Iran's interests.

Oil Swaps

We had to appear to be reasonable with respect to swaps and to indicate that we would facilitate the swapping of oil. This was the cheapest option for producers. We would increase our concessions to non-American producers. However, for this to be a significant weapon, we had to have the producers that had American participation. Therefore, we had to achieve a reversal of American policy. We would do that by increasing our concessions to non-U.S. producers to engage in swaps as well as offer incentives to U.S. producers building on the knowledge that U.S. policy is disadvantaging them and trying to induce them, in turn, to increase pressure on their government. Many of the teams indicated a willingness to increase the volume through the Iran route through more and larger swaps.

Defeat a Cross Caspian Pipeline and/or a Bosporus Bypass

The cross Caspian line would connect the East and West producers and basically make them one bloc, increasing the attractiveness of a MEP. Also, the Bosporus Bypass would increase the attractiveness of a Supsa route or a Russian route to the Black Sea. Defeating these made Iran an excellent 'Bosporus Bypass.'

To defeat the Cross Caspian line, we had the following strategy.

- *Like Russia, we shamelessly embrace the environmental issue.* In fact, we have reached an agreement with the Russian team that no pipeline should be built across the Caspian without the full discussion, participation, and agreement of all five littoral states.

- *We believe that Iran is the logical way to avoid cross-Caspian pipelines and to avoid Black Sea and Bosporus issues.* Eventually, this path could lead to a main export pipeline that uses one of Iran's existing north/south pipelines and provides a link to Karg Island.

Focus on the Economics

Economics was the overwhelming advantage of the Iranian route. We saw the position of the oil companies as very enlightening. Their focus on the economics demonstrates that Iran must be a major player in the Caspian play due to the

existing infrastructure. Swaps provide an opportunity for a phased approach that builds on the existing pipelines through Iran and builds on our infrastructure that provides immediate market access. This is attractive because it provides markets and immediate cash returns to producers.

Change Perceptions of Quality/Reliability of Southern Route

We recognize the perceptions about this route and we are working very rapidly to resolve the technical issues that have been involved in this trans-shipment in the past.

To achieve these objectives, Iran would have to adeptly apply its diplomatic efforts over varying fronts.

- *The United States had to be exposed in its effort to politicize the Caspian MEP issue.* This could likely be done best through providing incentives to the oil companies and as a result putting pressure on the U.S. Government.
- *Concurrently, we also will continue to work with Turkey on a Baku-Ceyhan pipeline that transits northern Iran, hopefully in parallel with a gas pipeline.*
- Working with the other Caspian nations in the environmental effort, while its goal was to delay/stop a cross-Caspian line, would shore up Iran's effort to be perceived as a good neighbor.

Caspian Demarcation

Most of the countries on the Caspian southern shore, particularly Azerbaijan were concerned about Iranian claims to their territories and wanted guarantees that we would not assert our rights to their claimed property in the off-shore sector and also that we would not block pipelines on environmental or other grounds. This made us clearly see that these were two strong cards that we hold and invited to keep a firm grasp of those in the diplomatic arena.

Iran's Role in Caspian Development Overall

The response we got from other delegations to this position was very encouraging. This has to be reinforced through further contact.

Finally, as stated above, we felt Iran's hand was strong and strongest in the area of commercial considerations. In the

Caspian environment with all the uncertainties - economic, political, environmental, and otherwise, economics are even more difficult that they would be for a similar project in a more stable region.

Therefore, the final determination of the pipeline(s) to be used for handling new Caspian oil has to be measured against the following questions.

- How do you match export capacity with production growth?
- How much oil can you commit before it's being produced?
- How do you avoid being hostage to the Bosporus without paying too much?
- Who is going to pay for Baku-Ceyhan?
- How do you prevent demarcation and environmental issues from delaying your projects?
- Where are you going to get the equipment and rigs to develop the Caspian?
- How do you get access to Asian markets?
- How do you protect yourself against another plunge in oil prices?

Come to Iran. We can do business.

KAZAKHSTAN TEAM POSITION

First, the team leader thanked the members of the Kazakhstan delegation for their valuable input, and particularly singled out the international officers from the U.S. Army War College, complimenting them on their study of the issues.

National Objectives

The Kazakhstan team national objectives were straight forward:

- Ensure multiple and diversified outlets for Kazakhstan oil and gas resources
- Manage political relations with neighboring countries
- Secure early revenue in the short-term
- Secure main export routes in the mid-term
- Establish Kazakhstan status as a regional and international player in the long-term

The key element of Kazakh strategy was protecting CPC, which did not surprise any other delegations. The next element was securing Russian, as well as Iranian, buy-in for multiple outlets, and securing evacuation at low transit costs. Overall, the Kazakh team said the same thing that others said: "It's the economics, stupid," and they intended to ensure fair and reasonable economic returns to the foreign investment community and the shippers. The last element was dealing with de-linking the resolution of the boundary issue to energy development. They were unwilling to let energy development of the Caspian be held hostage to whatever solution comes out of the boundary issue.

Pipeline Options and Priorities

- Different pipeline options were considered and developed into the following order of priority:
- Protect and pursue development of CPC
- Engage in early swaps with Iran
- Move forward in negotiations with affected transit countries on Baku-Ceyhan
- Fully explore Chinese pipeline option (Long-Term)

Again, first and foremost was protecting and pursuing the development of CPC or even the acceleration of a CPC. The team gladly welcomed the positive signals that the Russian team sent in this regard. Significant political and economic capital has been invested to date. This would help maintain close ties with Russia while also providing mid-term economic benefits to Kazakhstan.

The second option, and one that the team was very committed to, was to engage in early swaps with Iran. This would provide immediate diversification of outlets, increase flexibility, and leverage Kazakh dealings with other countries. It would also provide shippers early economic returns at low cost, another objective. Also, this would be a first step in building closer political and economic relations with Iran. The logic was that it would encourage Iranian buying and trans-Caspian exports, a needed element if Kazakhstan is to move forward on trans-Caspian development of pipelines or barges. This would establish the first step to securing a southern corridor for Caspian exports. Discussions with the Iranian team were encouraging toward offshore projects and there was hope of Iran and Kazakhstan being able to enter into iron clad commercial agreements. Both teams agreed that there were problems in the past that would have to be overcome.

The third option was to move forward with the Baku-Ceyhan pipeline route, which fit in the overall strategy. Baku-Ceyhan would build regional cooperation and ties with the western security structure. This was seen as a non-Russian alternative. It also avoids the straits while building a link to the target market for gas, something that Kazakhstan is very interested in for the long term with Turkey. It also enhances the cooperation with the U.S., assuming that the U.S. does not back away from their position on Baku-Ceyhan.

The Kazakhstan team was encouraged by the strong signals received from Azerbaijan about flexibility on the ownership issue. They were discouraged, however, by talks with the eastern and western oil producers. The producers were supporting Baku-Supsa and the Kazakh team was unclear what to do with that. They were frankly discouraged with the Turks who focused only on the Bosporus. It's certainly not just the Bosporus for Kazakhstan. They were looking more from Turkey on the commercial aspects of Baku-Ceyhan. Despite sensitivity over the most recent tanker accident and very difficult negotiations with some of the other countries, they were not encouraged by the Turks on the commercial aspects. This is an option that we are fully committed to. Its long term, yes, but from a strategic standpoint it's very important to Kazakhstan.

Lastly, it is important to maintain close ties with China. This will strengthen the Silk Road trade route and provide access to growing Asian markets, and that's what we're thinking about: the growing markets. This includes the European market, the Mediterranean market, the Persian market, the Persian Gulf, and the Asian market. We also want to look at the Asian market through China. While this would not involve too many different transit countries in building a route to China, it would require negotiating difficult terrain and paying a very large cost. What does this do? It provides an opportunity for Kazakhstan to secure Chinese investments, for investments in China, and also for an exchange of economic and commercial relationships. It maximizes our long term investment potential and aid in the development and stabilization of Kazakhstan, particularly the eastern part, and that means investments, jobs, and infrastructure. Frankly, it's a good short-term bargaining chip when we're talking to other countries about different pipeline routes and different pipeline deals.

Long Term Strategic Goals

From Kazakhstan's standpoint, it's an important component to realizing the country's long term strategic goals.

- Maintains close ties with China; strengthens "silk road" trade route
- Provides access to growing Asian markets
- Eliminates transit countries

- Provides opportunity for Chinese investments
- Maximizes long-term investment potential
- Aids in development/stabilization of Kazakhstan (investment, jobs, infrastructure)
- Good short-term bargaining chip

Honest Broker

There was a corporate view on behalf of all of our delegation to be an honest broker. This is not the view of Kazakhstan, however. It is more of a mixed bag of economic, environmental, political, and security issues. We could not come up with a single entity that would be capable of serving in that role that would be perceived as being objective. Our view was whatever is going to happen in the region is going to require a big bag of money. We could not envision any organization, or honest broker, or any state organization that would be able to pull that together or to broker that kind of relationship. However, what might be helpful in the region is the formation of regional trade blocks, sharing regional economic cooperation.

UNITED STATES TEAM POSITION

The position of the United States was apparently misunder - stood with regard to the commitment to the Baku-Ceyhan route. This became apparent during all the briefings prior to the U.S. Presentation. However, the position of the U.S cannot be construed to be other than fully supporting the Baku-Ceyhan route. The importance of Turkey as an ally in this region, the challenges associated with the Russian segment of the region, and the political realities associated with the Iranian option make the Ceyhan route, by far, the most palatable. However, there are other issues as well.

Background

There's no question that we are dealing with very frustrating issues with respect to the geopolitics. Unfortunately, some teams heard only what they wanted to hear while others drew false conclusions from what they were told, resulting in some confusion. Foremost, the U.S. did not sell out on the Baku-Ceyhan pipeline. Nor has it fallen into the trap of selecting a policy and sticking with it no matter what the realities are. The U.S. has avoided that predicament while diligently negotiating a policy that reflects both the realities of the day as well as meeting the interests of as many players in the region as possible.

We are reminded that the art of international politics is the art of compromise. We see Baku-Ceyhan in two phases, but we all understand that current oil production doesn't warrant the full line to Ceyhan at this time. We recommend doing it in phases - Baku-Supsa, then Tablilisi, Ceyhan, as warranted. Looking at the tanker accident, which has to be considered, and the increasing volume of traffic, we understand from the Russian side that the CPC pipeline is to go into operation, not by the end of year 2001 or 2002, but 2000. That will put immediate pressure on the Bosporus Straits. Accordingly, we recommend that immediate construction begin on an additional Turkish pipeline bypassing the Bosporus.

Key Issues

The United States' key issues are:

- *To achieve a diversity of supply for both sources and delivery. This is the keystone of U.S. policy.*
- To decrease the amount of oil going through the Bosporus so as to relieve it as a critical choke point.
- To improve the environmental conditions of the Black Sea and the Caspian Sea to the benefit of all.
- To accept Iran as a transit country is non-negotiable; increasing oil flows out of the Persian Gulf is not in any importing country's interest.

- To allow pipeline and production decisions to be made by the market, which will select the best alternative; recognize that political concerns operate on the margin.

In our judgement, the biggest message that should be understood is that the market is the honest broker and will ultimately drive pipeline decisions. This is the message that at some point in time has to be understood by all new exporting countries.

Important Observations

A couple observations are worth mentioning so that they are not lost:

- *Unrealistic expectations are the name of the game in the Caspian Basin today.*

- We recognize in saying that the U.S. should allow the market to drive decisions is not all that simple because you cannot divorce politics completely from what is transpiring in the Caspian Basin. It is our opinion that at this early stage of development you are bound to have decisions driven first by politics and secondly by economics. Ten years from now decisions will likely be commercially driven and not politically driven. However, when nations look at areas of influence over any region with so much at stake it is a given that politics will play a key role in the initial phases. That will not be the case forever. *Once the key decisions have been made the market will take over. Today, however, in many areas such as this, politics drive the decisions.*

- The U.S. would very much like to see Iran as a player in the Caspian Basin because when Iran is engaged, it is much better for all concerned rather than having Iran on the outside looking in. We have time and time again told Iran what they must do if the sanctions on Iran are to be removed. They understand what they have to do. Perhaps they're moving in that direction, but from the U.S. point of view, we will watch what they do and less what they say. We see no evidence now that there would be reason for us to remove the sanctions in the coming months. While it is unfortunate that sanctions interfere with normal developments in the market place, it must be recognized

that sanctions are politics, and the use of sanctions has become an easy political tool for nations to wield.

- *We support the proposal to begin immediate construction of a pipeline to bypass the Bosporus Straits.* We are as concerned about the Bosporus as Turkey is and we are on record as telling them that. We want to be helpful, unlike the Russian team that used the environmental issue as a means to another end. *However, Turkey must be more flexible about the timing of the Baku-Ceyhan pipeline.*

WESTERN & EASTERN OIL PRODUCERS TEAM POSITION

During the Caspian Sea Exercise, the team representing the Eastern Oil Producers and the team representing the Western Oil Producers found that they had much in common with respect to objectives to be reached at the con- ference. This was likely because all of the team members, unlike the true members of an Eastern Oil Producers team, were from capitalistic countries and thought from a capitalistic frame of reference.

In truth this would almost certainly be the case for the Western Oil Producers but highly unlikely for the Eastern Oil Producers who would largely hold to the political ideology of their home governments of which, to an extent, they would be a part. This report then, represents the views of the combined team during the exercise; but in reality it would likely mirror the views of a true representation of Western Oil Companies and bear little resemblance to the likely position of the Eastern Oil Companies.

Background and Economic Reality

Western Oil Companies generate wealth through the exploration for and production, refining, and sales of hydrocarbons. The amount of wealth generated is a function of the size of the fields, the cost to develop that asset, the costs to get the product to market, and finally the price received for the product at the burner tip. Oil companies are businesses that are normally global, with various areas competing for their capital invest- ments.

Parameters which govern the competition for capital are the quality of the hydrocarbon, costs of development, transportation costs, government stability and the economic system, and other factors. Such was the case with respect to the producers' position on the best route for the Main Export Pipeline (MEP). While companies are sensitive to the environment (good environmental posture is good business) it is the rate of return on the investment of capital which would govern, and did govern, the position of industry in selecting of the MEP.

Analysis and Political Considerations

The Azerbaijan leader hosted the conference for the sole purpose of achieving approval of the Baku-Ceyhan route. This would balance Iran and Russia, and was favored by Turkey and, until the day of the conference, the United States. Baku-Ceyhan would be a geopolitical and environmental plus for the United States in that it would provide an economic boost to Turkey, its democratic ally, but would avoid Iran and Russia.

However, from the choices available it was, without doubt, the most expensive route to build and to operate, reducing significantly the ultimate return on the capital investment that would be required to construct the MEP.

The lack of political stability in the region, even in Azerbaijan itself, created significant financial risk to investment in the area.

The oil companies favored the Baku-Supsa route that would have delivered the oil to the Black Sea requiring transportation through the Bosporus to the Mediterranean, or possibly including a Bosporus bypass. This much cheaper route also would facilitate a phased Baku-Ceyhan route which would allow early oil to be moved through the Bosporus; but as more new production came on line, the second phase of Supsa to Ceyhan could be constructed. The oil companies pointed out, however, that a decision was not needed now. Further, the moderate, recently installed Iranian government held the prospect of better relations with the United States. This, in turn, could potentially

lead to lifting sanctions, which would facilitate a southern route option through Iran to the Persian Gulf.

The key, then, to achieving approval of the Baku-Ceyhan route rests with finding common ground between the oil companies and the governments of the U.S., Azerbaijan, and Turkey. These governments, in reality, all want this route for very different reasons, while the oil companies would chose any of the other choices, with the possible exception of the Russian route, over Baku-Ceyhan due its cost to build and operate. The challenge was to determine what each could and would give up to further its interests. For the governments it was their economic and political interests, while for the oil companies it was just their economic interests. In this case there was neither a power broker to force a decision nor another actor to leverage other aspects of any nation's power to swing support to Baku-Ceyhan. The principal actors had to find that common ground.

Common ground is always found in the hard realities of a situation. In this case, the hard reality was the hard currency required to build and to operate the pipeline. In almost every case, this rests with the company that is developing the hydrocarbon reserves, or in some cases a company who chooses to generate its wealth through providing this service to the producing companies. In this case, however, due to the high costs of Baku-Ceyhan, these costs would almost certainly have to be shared between the oil companies and possibly all of the other actors. Given true cooperation, defined as cash on the barrelhead, between Azerbaijan, Turkey, and the United States, Baku-Ceyhan could be a reality and a win for all concerned.

Observations and Findings

The U.S. has much to gain from the Baku-Ceyhan route. All of these have value, although they will differ based upon the vantage points from which they are viewed.

- *This area is among the most unstable regions of the world,* largely as a result of the breakup of the Soviet Union whose hard-line, autocratic rule maintained order.

- *Turkey is almost certainly the most stable nation in the region,* a democracy and a friend to the United States. An investment in the relationship through financial support for the Baku-Ceyhan route could certainly be justified as

easily, or more so, than many other foreign aid investments made regularly by the United States.

- *Avoiding Iran continues to pressure the U.S. to denounce terrorism,* a very popular position for the U.S. government with its citizens.

- *Avoiding Russia is in the best interests of the United States as well* and there is some tangible value to the Baku-Ceyhan route associated with this aspect.

- *Support of Azerbaijan by the U.S. would presumably facilitate the move of this nation, and likely others in region, from a socialist type philosophy to a capitalistic philosophy.*

While the U.S. government has the ability to provide significant aid, the Turkish government does not. This very poor nation has little cash and is depending on the Baku-Ceyhan route to boost its economy, first in the construction and finally in the tariffs associated with transport through the pipeline. However, for Baku-Ceyhan to work, it is likely that Turkey would have to make some concessions on the tariffs during the early years of production and allow some additional transport of oil through the Bosporus to allow a phased approach, through Supsa, to the Baku-Ceyhan line. Turkey then would initially accept the additional traffic through the Bosporus and its associated environmental liability and, in the short to mid-term, reduce tariffs until the oil companies have recovered most of their costs.

Azerbaijan has already made many concessions to the oil companies. The producers will recover all of their investment before any significant sums are paid to Azerbaijan for royalties. However, more might have to be done by Azerbaijan to make Baku-Ceyhan a reality. This could include reduced lease costs for additional acreage, reduced tariffs over the section of the line in Azerbaijan, or other creative win-win relationships which would encourage development of Baku-Ceyhan and other hydrocarbon plays within the Azeri nation.

Advantages of Baku-Ceyhan Route

Baku-Ceyhan can, indeed, be a win-win solution for the U.S., Turkey, Azerbaijan, and the oil companies. However, it will require a very careful approach by the U.S. to avoid being seen by the citizens as "helping the oil companies." It must be seen as:

- *Helping Turkey*
- Protecting the environment by keeping the oil out of the Bosporus and the leaking pipelines of Russia
- *Keeping the oil out of Iran and the unstable Persian Gulf region*

It could be a win for Turkey but it will require a change of perspective fromTurkish nation that Baku-Ceyhan will provide immediate wealth. In fact, Turkey will have to forego some of the early wealth by some relief on tariffs, and construction costs will have to be maintained as low as possible.

Expectations in Azerbaijan are also high. While the Azeris will win by early development, their perceptions of immediate wealth are also doomed for a quick demise which will likely result in a backlash of public opinion. Further concessions will only exacerbate that.

Baku-Ceyhan is a win for the oil companies because it is likely the most secure route. Supporting this route will contribute to that stability, supporting the governments of both Turkey and Azerbaijan. However, even with the concessions from the nations listed above, there will be an additional price for this security. Baku-Ceyhan, in a staged development, will still be the most expensive option.

Conclusions

Baku-Ceyhan can be made to happen but only when the harsh economic realities are addressed and all of those with significant interests are willing to participate in the investment required to make it happen, both economically and politically. It will take the economic and diplomatic areas of power of all three nations applied efficiently and cleverly to bring it to reality. It will be worth the cost, perhaps most of all to that country that had second thoughts at the conference, to the United States of America.

RUSSIAN TEAM POSITION

The position of Russia, like the position of most of the other players in the geopolitical drama, was predictable.

Key Issues

Russia had three key issues at the start of the exercise:

- Oil must continue to flow through the Bosporus, and current and other restrictions that are proposed by Turkey are unacceptable.
- Russia must be an export route for some share, preferably 90%, but some reasonable percentage of the Caspian oil.
- Russia must remain a major influence in the region possessing the right to veto any unfavorable courses of action, primarily routes that would use the offshore Caspian legal and environmental regime as subterfuge.

Objectives

To protect the interests noted above, Russia had the following objectives

- *Prevent a Baku-Ceyhan pipeline from occurring*
- Ensure the Bosporus remained available as an option
- Emphasize the instability of a Baku-Ceyhan route
- Threaten the use of all available national resources, but only as a last resort

The primary objective was to prevent Baku-Ceyhan from happening. To do this they hoped to siphon off the Kazakh crude and to attract as much early oil from Azerbaijan as possible. Therefore there would be little oil available to flow into the Baku-Ceyhan line. To ensure this, they would have to ensure that the two producers remained non-aligned.

However, this objective was not reached and the opposite occurred when the teams representing the Eastern and Western producers respectively joined forces.

The key was to determine how Russia would be attractive as an evacuation route. The first thing we wanted to do is make sure nobody had any questions about CPC. We were willing to throw in the quality bank, ensure reasonable transport tariffs, etc. to put in a favorable light with all parties.

The second objective was to make sure the Bosporus remained available. A lot of things can be done with the Bosporus within the Montreaux. We wanted to make sure and get these on the table and, in particular, we wanted to secure U.S. pressure to ensure that Turkey was more amenable to this particular line. Turkey, unfortunately, was incredibly hard-lined because it was their one card to play.We hoped that this attitude would be carried on to other meetings so that people realized that there's a problem with the Turkish hard line position. Russia was more than willing to trade away the legal regime and the uncertainties there for continued Russian participation on the upstream side.

Furthermore, in an effort to siphon off as much oil as possible, we basically were willing to throw our support to any and all routes except Baku-Ceyhan. The reason is because the U.S. likes Baku-Ceyhan. So, we want the opposite approach whether it was Iran, China, exiting networks, bypasses, or anything on the agenda to make sure we could limit the amount of oil available to be dedicated to Baku-Ceyhan.

Advantages of Russian Route

The team feels that time is on Russia's side in this debate. The longer that the decision is delayed, the more likely that people are going to realize that the Russian route is the better option for the following reasons:

- *Russia is more stable than many of the alternate transit countries and therefore the Russian route is the most stable over the long run.* While that might be argued right now, you will recall that in 1992 many thought that Russia was quite stable. They also realized that it is debatable whether Azerbaijan, Kazakhstan, Georgia, and some of the other places in the region might still be on the map in five years. We want to emphasize the instability of the Baku-Ceyhan route. We could actually talk about the instability in Georgia and other locales.

- *Russia has an entire exiting infrastructure.* As a result we believe that we are the lowest cost evacuation source, and especially for the producers on the eastern side. While it might be debatable for the western side, our strategy was to focus on the eastern side.

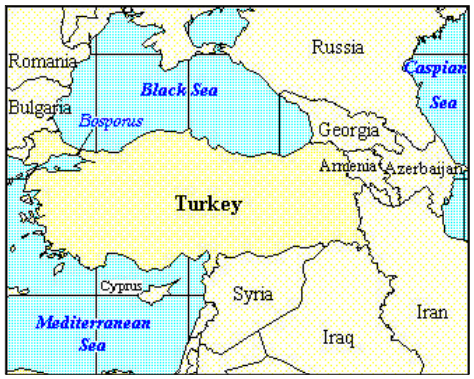
- *Further, in the Russian system you can put your oil in and take it out at a variety of places.* As the ability to ramp up becomes available, we will have quite a bit of flexibility.

- *As for the attractiveness of the regulatory regime, we wanted to make sure that people realized that they could move oil all the way to inland markets.* Russia already had a Bosporus bypass of sorts working and we would be willing to guarantee a stable flow as a last resort; if producers inserted oil into the system, TRANSNEFT would act as the guarantor of the volumes coming out the other end.

- *To be more attractive, we made sure the proposal for MEP on Russian territory would be basically along the line of the CPC, a multi-national consortium that could include government entities, along with producers that would be a self-standing and operating pipeline.*

We are not building anything too much in the way of new construction, which is environmentally preferable and another sort of subterfuge.

TURKISH TEAM POSITION



The best thing that could have happened to Turkey during this period was the oil spill generated by the tanker *Spirit of Africa*. This situation, ongoing for just two days at the onset of the conference, increased the power of Turkey, but in an unorthodox way.

We will discuss this as we progress our discussion of the Turkish position at the conference based on expectations and ultimately potential gain from a MEP routed primarily through its territory.

Background and Analysis

Turkey is not a rich state; it is very poor with its population suffering. It is not a state with clout, but must play the cards of being friendly to the U.S. in an area near Iran and Russia, two trouble spots for the U.S. It has little oil production and little experience in the transporting of oil, but wishes to control a very large pipeline with all of the benefits thereof. What Turkey does have is control of the only current outlet for Caspian Sea crude. This control has been limited, however, with international agreements which allow all sea traffic passage through the Bosporus.

To reinforce this position of marginal strength, Turkey must use the threat of legal interruption of commerce through the Bosporus on the grounds of environmental security. Not that this is a bad argument in that several spills have occurred in the Bosporus including the most recent spill which is soiling the beaches. The fishing industry has been destroyed and the migration of sea mammals through the straight has effectively stopped, threatening the ecosystem.

However, is the environment the real key to the Turkish position? If so, would not a line south to Iran from the Caspian reduce the amount of oil which would ultimately be transported through the Bosporus? Furthermore, would not a Bosporus bypass on the western borders of Turkey to Thrace remove even much more oil from the Bosporus, drastically reducing the threat of environmental damage from the transport of crude? The truth is that the environmental issue was utilized to advance an economic goal.

Advantages of the Baku-Ceyhan Route

The Baku-Ceyhan route would benefit Turkey in all of the areas stated in the second paragraph where Turkey is really weak.

- *First and foremost the construction and operation of the Baku-Ceyhan route would help many of the Turkish people, not to mention the leadership who are touting this option as a solution to the Bosporus problem and a boon to the economy of Turkey.*

- Also, it would increase Turkey's clout in that the importance of the pipeline and the necessity to protect it, would make this a key area of U.S. interest and an interest of other western countries and neighboring states. The team made it very clear that Turkey did not want to play a 'subsidiary role.'

- Turkey would immediately become a much more key ally, first from the decision of the companies to build the pipeline along this route, and during the operation of the line.

- The Baku-Ceyhan would provide the U.S. a key source of oil from this region not associated with the Persian Gulf and its inherent instability.

Analysis of Turkish Position

The Turkish delegation did a great job playing a weak hand. Particularly in light of the confusion of the initial U.S. position, the delegation skillfully negotiated potential agreement with Azerbaijan concerning the phased development of the Baku-Ceyhan route, accepting increases in Bosporus traffic immediately. This was a good trade in that the Turks had little

power to impede the movement of the oil through the Bosporus anyway. Also, the 'shot across the bow' of the possibility of utilizing the Iranian lines was a skillful move which would undoubtedly inflame public opinion in the U.S. and also affect actions in the U.S. Congress, particularly in light of the recent oil spill.

The Turkish delegation recognized quickly that neither economics nor timing supported their position. They countered the economics with the environmental situation and their potential to reduce economic benefit of lesser cost options by interrupting Bosporus traffic; they countered the timing issue, i.e. the lack of the need for quick movement by the oil producers, with the agreement of the phased approach. Finally they stressed the value of their Ceyhan port and the unused facilities, playing down the potential conflict when/if Iraqi crude was again put on the market indicating that there was sufficient capacity (although that is not clear).

The Bosporus bypass idea would no doubt play to potential persons/institutions sympathetic to the Turkish concerns over the environmental damages to date, and the increased potential with additional traffic through the straits. However, again the delegation skillfully skirted with the implication of a risky route near Greece subject to sabotage and also a less than adequate port in the Aegean Sea implicating risk of spills there. This had the impact of reducing the environmental benefit of the Bosporus bypass option.

Recommendations

The diplomacy of the Turkish delegation was as skillful as any team participating and in most cases they fully developed and expanded their case considering the time available and opportunity to do so. However, had the exercise lasted longer, and had the opportunity to validate perceived pre-conference positions of key allies, as would be the case in normal circumstances, the following is advised and almost certainly would have been entertained and likely developed by the Turkish team.

- The misunderstanding with the United States was cleared up fairly quickly as none of the other options were likely to be acceptable to the U.S. The phased approach would likely have been acceptable as it allowed more time to

evaluate the fields and to estimation of reserves and sustainable production.

- Further development of the relationship with Azerbaijan would have occurred. Each of these neighbors absolutely had to have the cooperation of the other: Azerbaijan to minimize the influence of Russia and Iran, and to avoid more risky routes; and Turkey who needed the Azerbaijan agreement on the phased approach to make Ceyhan more palatable. The development of a more mature proposal involving tariffs and other key areas would have been very beneficial.

- Further development of an agreement with the Eastern Oil Companies and Kazakhstan would likely have been possible with additional time. While the Eastern Oil Producers aligned with the Western Oil Producers in the conference, their interests are quite different, considering the alignment with the governments of the host countries. It is likely that in complex negotiations, the agreement between the oil factions would have been weakened and the EOP would migrate toward agreements with Turkey and Azerbaijan.

- Further use of informational power to influence public opinion in the U.S. is possible but would have to be wielded carefully to avoid the unwelcome outcome of a practically forced acceptance of a Bosporus bypass solution.

Appendix A

Agenda

Monday 16 November 1998

12:00 - 12:45	**Conference Registration**
1:00 - 1:15	**Welcome** **Ambassador Russell** **Dr. Butts**
1:15 - 2:30	**Plenary Session I** **Peter Bass** **Gary Vest** **Regional Ambassadors**
2:30 - 3:00	**Break & Group Photo**
3:00 - 4:30	**Plenary Session II** **MG Charles Wax** **RADM John Sigler** **Robert Ebel** **Dr. Brian Shaw** **Dr. John Daly**
4:30 - 5:00	**Game Briefing**
5:00 - 5:30	**Team Leaders' Meeting**
6:00 - 8:00	**Reception**

Tuesday 17 November 1998

8:00 - 9:00	**Development of Initial Team Positions**
9:00 - 9:20	**Team Negotiations**
9:25 - 9:45	**Team Negotiations**
9:50 - 10:15	**Development of Team Strategies**
10:15 - 10:40	**Break**
10:45 - 11:05	**Team Negotiations**
11:10 - 11:30	**Team Negotiations**
11:30 - 12:30	**Preparation of Briefings**
12:30 - 1:15	**Lunch**
1:20 - 2:30	**Team Briefing Presentations**
2:30 - 3:45	**General Discussion**
3:45 - 4:00	**Wrap Up**

APPENDIX B

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APPENDIX C

OTHER CSL ENVIRONMENTAL SECURITY ACTIVITIES

Copies of previous Environmental Security publications by the Center for Strategic Leadership, U.S. Army War College can be requested by one of three methods.

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