

DANGEROUS GOODS PANEL

Dubai, 31 March to 4 April 2003

**REFUSING RADIOACTIVE MATERIAL SHIPMENTS FOR
TRANSPORT BY AIR**

(Presented by the Secretary)

1. INTRODUCTION

1.1 The attached paper was presented at the IAEA TRANSSEC VIII meeting and is provided here for the information of the working group.

Information Paper No. 20

Agenda Item Topic No. 9.1

Refusing Radioactive Material Shipments for Transport by Air

Actions Requested of TRANSSC:

1. TRANSSC is requested to review the attachments and provide advice on appropriate action to take.

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Information Paper No. 20
Agenda Item Topic No. 9.1

Refusing Radioactive Material Shipments for Transport by Air

Background:

In autumn 2002, the Transport Safety Unit was made aware that the Agency is encountering difficulties in delivering radionuclide sources to Member States qualified to receive assistance under the Agency's Technical Co-operation Programme. Radionuclide sources being provided by the Agency to recipient States were being rejected by airline companies, airline pilots and operators of airports for transport by air. The situation affects Technical Co-operation projects in Africa, Latin America and the Europe regions.

In addition, the Secretariat has become aware of a number of situations where consignors of radionuclides for applications in agriculture, industry, medicine, etc. are having difficulties in accomplishing their shipments, especially by air. It has been reported that many air carriers and some airports are denying the ability to ship consignments of radioactive material (e.g., it has been reported that a number of regular carriers including British Air, Cathay Pacific, KLM and a number of specialized freight carriers such as Fed Ex, Airborne Express, Cargo Lux, and USF have terminated this service).

Unless appropriate action is taken, the beneficial applications of radioactive material in the medical, agricultural, industrial and research areas may be seriously constrained.

The attachment contains copies of communications within the Secretariat that describe some particular instances of denied shipments, and a position paper that is being used as a basis for discussions between the Transport Safety Unit and the Department of Technical Cooperation for finding appropriate solutions. An important step being recommended by the Dept. of Technical Co-operation is the creation by the Transport Safety Unit of a forum at which involved parties may exchange views on the issue, and discuss ways to effectively solve the problem.

A possible forum to initiate such discussions may be the Technical Committee Meeting on Guidance for Applying the Regulations (tentatively scheduled for 26-30 May 2003).

The following information is provided to facilitate review of the attachments:

Mr. Qian – former Deputy Director General, Department of Technical Co-operation (DDG-TC)
Ms. Shea – staff member working in the office of the DDG-TC
TSU – Transport Safety Unit
Mr. H. Yamashita – Head, Field Procurement Section, Department of Technical Co-operation

**Issue Paper on Refusal by Airlines and Pilots to
Accept Consignments of Radioactive Material for Carriage by Air
Prepared by R. B. Pope and M. T. Brittinger
14 February, 2003**

In a 30 October 2002 email from Doris Shea (transmitted on behalf of Mr. J. QIAN, DDG/TC – Attachment 1), it was noted that there is a continuing and growing problem with shipments of radioactive material being refused by carriers, specifically air carriers.

The Transport Safety Unit (TSU) has been aware of this problem for some time, but it has not been able to effectively pursue its resolution for a number of reasons including, inter alia:

- The pilot in command of a commercial aircraft always has the right to refuse any cargo or passenger for transport on his aircraft;
- An individual airline has the option to completely refuse carriage of certain types of cargo (e.g., radioactive material); this has recently occurred with some air carriers (e.g., British Airlines, KLM, Cathay Pacific, Fed Ex, Airborne Express, Cargo Lux, and USF);
- An individual airline may choose to impose specific and additional requirements before it will accept radioactive material consignments;
- Many airline pilots and other airline employees have insufficient knowledge regarding radioactive material consignments and their resulting fears may lead to their refusal to handle or carry this cargo.

When the issue of airline or pilot refusal of shipments was first brought to the attention of TSU in fall 2000 first surfaced, TSU personnel discussed the problem with representatives of the professional organizations representing the airlines and the pilots (IATA and IFALPA, respectively). The basic response was that they would be willing to address the problem, but that they needed specific details about the shipments that had been refused for carriage. TSU staff also discussed the issue with airline managers in Australia during a training course in 2000 and received a similar message, while also being reminded that the pilot in command always has the right to decline to carry any specific cargo.

The need for specific information about refused shipments was communicated to the relevant Technical Co-operation staff, but – to date – such specific information has not been forthcoming. Indeed, the information provided by Ms. Shea in her email is not sufficient to allow fruitful communications with IATA, IFALPA and/or specific air carriers. Further, some of the problems outlined in Mr. Qian's note go beyond airline/pilot refusal: (1) some suppliers/users appear to be attempting to transport sources in old, unauthorized package designs; and (2) some countries require and – in some cases – limit the issuance of import licenses, and (3) it is not clear whether the competent authorities involved are fully aware about their duties and responsibilities.

With regard to shipments denied by airlines (ETH5012, SUD5026, KEN5022 and NIC6007 of Mr. Qian's note): the data needed to allow meaningful dialogue include:

1. Full identification of consignor
2. Full identification of consignee
3. Type of source involved
 - Radionuclide(s)
 - Amount of activity
 - Form of material (special form or other than special form)
4. Type of package (if Type B, Competent Authority identification mark)
5. Proposed
 - date of shipment

- originating airport of shipment
 - air carrier
 - route (flights, transfer points)
6. Air carrier response
- date of denial
 - reason for denial
 - denied by air carrier or pilot in command
7. Consequence of refusal by air carrier

Thus, for shipments that have been/are being refused by airlines or pilots in command, it is recommended that

1. the above information be collected by those who were attempting to ship the package(s)
2. the information be transmitted to the TSU, and
3. the TSU staff then establish specific-problem dialogue with the IATA and/or IFALPA as appropriate.

In these examples, it is also not clear if the countries involved have national regulations for the safe transport of radioactive material and if the countries have regulatory authorities who are competent in implementing those transport regulations.

With regard to consignors attempting to ship in unauthorized package designs (MOR5024 of Mr. Qian's note): This demonstrates that the IAEA Transport Regulations are working, at the state level, as they are intended. It would be completely inappropriate to encourage a supplier (i.e. consignor) to attempt carriage that is not in full compliance with the Transport Regulations.

With regard to States' denying shipments because licenses are not available (BOL6021 and GEO6002 of Mr. Qian's note): This appears to be related to individual States' legal/regulatory infrastructure applying to the import of sources, which is an issue that goes beyond the area of safe transport.

Following Mr. Pope's presentation on safety and security in transport at the Aviation Security Conference in Rome (29-31 October 2002) he was approached by a number of pilots wanting more detailed information regarding the transport of radioactive material. This indicated that pilots may be refusing carriage out of sheer ignorance: that they are not well informed on the subject and, therefore, fear the cargo. TSU might consider developing a simple tutorial document directed toward airline personnel to assist them in better understanding the issues associated with radioactive material transport. This could facilitate alleviating their fears and their acceptance of these shipments. In addition, TSU might bring the issue to the attention of IATA and IFALPA and work out the need for those two professional organizations to propagate the need for proper training among its members.

During a conference in Edinburgh on 5 November 2002, two discussions occurred that relate to this issue.

- First, Mr. Pope discussed with Marc-Andre Charrette of MSNordion (Canada) the problems that they are encountering with the shipment of large sources by air. Mr. Pope suggested that MSNordion relate to TSU the specific information (see list in prior section) to see if TSU can facilitate discussions with IATA and/or IFALPA, and thus facilitate the resolution of MSNordion's problems with airline refusals.
- Second, Mr. Pope was approached by Ms. L. Bray, a representative of Science Applications International Corporation (SAIC) in the USA. They have developed a screening device that uses a large radioactive source, and they have been denied carriage by airlines to the facilities where the device is intended for use. She has since communicated with Mr. Pope and has promised to send to the TSU information about their problem, with details as noted above for specific consignments attempted.

Concurrent with these events, Mr. Pope was interviewed electronically by Ms. J. Couillard of the IATA Dangerous Goods Focus newsletter regarding the "Safety Implications of Delaying or Refusing Shipments of Radioactive Isotopes with a Short Half-Life". The primary issue again

is that air carriage of radiopharmaceuticals is being denied by air carriers and pilots. The article, though written in a non-technical, journalistic style, does a good job of addressing some of the issues and may assist in pilot and airline acceptance. A copy of the draft of that article is at Attachment 2.

Two TSU staff participated in a two-week regional training course in Centurion, South Africa (4-15 November 2002). The course included:

- a tour of the radionuclide production facilities of NTP (Nuclear Technology Products) at Pelindaba,
- a tour of the Johannesburg airport cargo handling facilities with a demonstration of how they handle the radioactive material packages from NTP,
- a demonstration by NTP personnel of the packages used for transporting radionuclides, and
- a detailed discussion with Mr. A. Bekker of NTP regarding the problems they have had with airline refusal and the manner in which they solved those problems.

NTP works mainly with South African Airways and Lufthansa for the air shipment of its radioactive material packages. Some months ago, Lufthansa announced that they were withdrawing permission to transport radioactive materials produced by NTP. Following discussions between NTP and Lufthansa representatives, the following actions were taken:

1. Lufthansa sent the South African airport cargo handlers involved in radioactive material shipments to Germany for training on proper handling of radioactive material consignments;
2. Lufthansa then required NTP to send all of their key packaging personnel to Germany for similar training (despite the fact that NTP had already trained all of these workers extensively);
3. NTP has taken extra care to ensure that their packages are of high quality (e.g., they are moving away from fibreboard boxes to metal drums for their Type A packages to ensure the integrity of the outer packaging surfaces);
4. NTP places a complete set of transport documents on each package (rather than having one set of documents per consignment);
5. NTP pre-books the flights with Lufthansa;
6. NTP routes their shipments to minimize transfers and – as far as possible – to keep the shipments on the same airline (either South African Airways or Lufthansa);
7. NTP completely avoids Schipol Airport in Amsterdam since KLM has denied carriage of radioactive material and the cargo handlers at Schipol are KLM employees (if a flight comes into Schipol, the cargo handlers refuse to touch the packages, and the packages must then be transported out of the Netherlands on the same aircraft that they arrived in); and
8. NTP has an agreement with the Lufthansa personnel at the Johannesburg airport that if there are any questions concerning a consignment or a package, they immediately contact an NTP employee who will travel to the airport and resolve the problem

As a result of these efforts, NTP is now experiencing good success in its radioactive material air shipments.

In conclusion:

The Agency's Transport Regulations have evolved from extensive efforts since 1961 and represent consensus among "regulators" and "regulated". Their requirements are binding on Member States world-wide for air and sea transport through the corresponding dangerous goods transport requirements of the International Civil Aviation Organization and the International Maritime Organization. The requirements of the Agency's Transport Regulations are binding in Europe for land transport (rail, road and inland-waterways) through the documents of the European Economic Commission.

There can be no question of relaxing the requirements of the Agency's Transport Regulations for activities of the Agency.

The solution of the problems described in Mr. Qian's communication lies, therefore, in ensuring that those who are involved in the air transport of radioactive material (consignors, air carriers and competent authorities) fully understand how they can meet the requirements of the Agency's Transport Regulations, and work together to achieve that radioactive material is transported to the place where their benefits can be put to the intended good use.

It is recommended that:

1. Consideration be given by TC to provide funding – through the TSU:
 - a. for an information-gathering exercise (electronic survey or Consultants Meeting) to identify the concerns of cargo handlers, pilots and airline management personnel, and
 - b. for a consultant (or consultants) to draft a simple tutorial document directed toward airline personnel to assist them in better understanding the issues associated with radioactive material transport.
2. TC should work with its suppliers of radioactive sources for developing countries to ensure that they properly prepare the packages for shipment, that they use packages that satisfy the current regulatory requirements, and that they work closely with and enhance communications with the airlines in scheduling shipments (in a manner similar to what NTP in South Africa is doing).
3. TC should ensure that countries receiving TC assistance have the proper legislation and responsible competent authorities in connection with the safe transport of radioactive material. This may require expert missions to review the national legislation for appropriateness, and training activities to ensure full qualification of the competent authorities involved.
4. TC and TSU should obtain the detailed information needed about refused shipments, and TSU should then work with IATA and IFALPA representatives to attempt to resolve the problems.
5. TC should consider organizing a workshop for those countries whose problems have not been resolved. The workshop should be organized for the regulatory authorities and the users (i.e., consignors and carriers) and discussions carried out to ensure that a common understanding is reached and solutions found to restore the acceptance of radioactive material packages for air shipment.

**Attachment 1 – Email prepared by H. Yamashita,
transmitted for J. Qian by D. Shea**

-----Original Message-----

From: SHEA, Doris
Sent: Wednesday, October 30, 2002 10:12 AM
To: GONZALEZ, Abel Julio; MRABIT, Khammar
Cc: YAMASHITA, Hiroshi; MOORE, Sara; GARCIA, Gloria
Subject: Shipment of radioactive and hazardous chemicals

Mr. Qian requested that the message below be forwarded to you as he would like to discuss it with you soonest please
Thank you.
d.

The shipment of equipment including a sealed source, radioactive material and toxic/hazardous chemicals has become increasingly difficult lately. Although it is unfortunately impossible to quantify the net adverse effect of Sept 11 terror, much more stringent control has been exercised by all airlines ever since. Many airlines do not accept radioactive material and high surcharges to carry dangerous goods have been applied. It may be worthwhile to note, however, that the difficulty to transport radioactive material and hazardous items has been sharply increasing over several years already.

With the implementation of certain TC projects, we are facing an enormous difficulty as the suppliers cannot find a way to ship these items and some examples are provided below.

ETH5012 and SUD5026

(24,000Ci blood irradiator for tsetse fly eradication project in Ethiopia and 10,000Ci food/crop irradiator for Sudan)

Although the contract was awarded to Nordion/Canada (largest manufacturer of irradiators) in October and November 2001 respectively, Nordion has not found a way to ship the irradiators despite a number and variety of attempts so far made.

KEN5022

(12,000Ci blood irradiator for Kenya)

The selected supplier: Board of Radiation & Isotope Technology (BRIT), India is unable to find a way to ship it to Kenya and asked the IAEA to find a solution. Since in all contracts it is the responsibility of the contractor to arrange transportation by obtaining all necessary permits, we are facing a stalemate. It may be of interest to note that nowadays only Nordion/CAN and BRIT/IND submit offers for irradiators. Earlier, suppliers from Russia, France, Hungary and USA used to take part in bidding but not anymore as they are unable to ship irradiators internationally.

MOR5024

In order to replenish the irradiator with new Co-60 sources, FPS has been negotiating with the French supplier of irradiator: CIS Bio.

However, the operation requires the container of the source which is an integral part of irradiator to be transported to France and back to Morocco. As the safety approval for the container unfortunately expired in 2000, the French authorities are not giving a renewal of approval. Consequently, CIS Bio is not ready to sign a contract. CIS Bio is now exploring the possibility of using a over-pack (cask) for the transportation of the container but it may take several months for approval. It is the same situation with the same type of French irradiator supplied to Tunisia under **TUN5013**. Although the project is closed, the counterpart requested the IAEA intervention in the face of stalemate.

NIC6007: The head of a Co-60 teletherapy unit must be returned to the original supplier in France.

According to General Electric design, the head contains the source and is used as transport container as well. As the Nicaraguan counterpart could not find an airline to take it, CIS Bio sent an approved cask (over-pack) to Nicaragua. However, after the Sept 11 terror, neither CIS Bio nor Nicaraguan counterpart can find a flight taking the cask (with head inside) back to France.

BOL6021:

There is a strict control of importing radioactive material and hazardous chemicals in Bolivia. A dose calibrator with a small built-in calibration source of Co-60; Cs-137; Co-57 could not be shipped to Bolivia (stuck in Florida) and had to be re-directed to another end user identified in Europe (BOH). There were also problems regarding shipment of Tc-99m generators for hospital use to Bolivia i.e., to get them shipped to internal destinations such as Sucre, Cochabamba, Tarija., but this problem has been solved.

GEO6002:

We procured a Siemens SPECT gamma camera. For this, the counterpart needs a Co-57 Flood Source. As the end user "Research Institute of Radiology and Interventional Diagnostics" has not obtained the necessary radioactive material license from the Government, it has not been shipped yet.

Hazardous chemicals:

As usual, it is the responsibility of the supplier to obtain the necessary permit to export. However, hazardous and toxic chemicals cannot be shipped together with other chemicals. They must be shipped as a single cargo and a special high tariff for freight is applied.

The point to be raised is the following.

The Agency is the organization which sets standards for transportation of radioactive material and all other entities (suppliers or transportation companies) must comply. With the assistance of NS and OLA, FPS amended the standard contract clause in January 2002 pertaining to "Transport Regulations, Packing and Marking" by referring to the IAEA "Regulations for the Safe Transport of Radioactive Material", 1996 Edition (Revised), Safety Standards Series No. TS-R-1 (ST-1, Revised).

Given the difficulty of implementation as illustrated above, we need to verify whether the above standards imposed by ourselves (the IAEA) are not too stringent or restrictive so as to suffocate the nuclear industry. If the trend continues, TC should review all future projects involving irradiators (such as fly eradication projects, food or multi-purpose irradiation projects or even radiotherapy projects etc.) and possibly cancel them all as they will have a built-in unforeseen delay factor in implementation schedule. The IAEA is promoting the peaceful use of atomic energy by TC projects and yet on the other hand restricting the shipment of radioactive material. Of course, safety must remain as one of primary concerns of the IAEA and we cannot resort to double standard. However, something must be done if the IAEA (TC) should wish to meet one of its mandates: assisting the Member States in the peaceful use of nuclear technology. The current situation is hindering not only the implementation of the on-going projects but also sustainability of already implemented projects. If the already small nuclear industry should get weary of restrictions and move away from nuclear technology, the IAEA would cease to function in terms of technology transfer. That is why this subject needs to be discussed in an adequate forum involving all the Member States.

regards

Hiroshi Yamashita/TCFPS
B1039, Ext. 22362

Attachment 2 – Draft of IATA News Article

Safety Implications of Delaying or Refusing Shipments of Radioactive Isotopes with a Short Half-Life

One major goal of dangerous goods transport is to get a specially packaged, marked, and labeled box or container of DG from one place to another without an incident. As long as the paperwork is right, it's easy to forget what specifically is being shipped.

But with some dangerous goods, that oversimplification could leave out an entire spectrum of other critical issues.

Short half-life radioactive medicals, which are Class 7 materials, offer a prime example of goods with a story to tell, both in transit and afterward.

For these goods, shippers, carriers, and regulators have responsibilities extending far beyond safeguarding flight crews and handling staff.

Packaging

Radioactive medicals with short half-lives must be specially packaged to safeguard passengers against a hazard that won't stop just because of a wall.

The medicals can come in either special form or some other form. The form of the material dictates how readily the radiation hazard could spread if the packaging were subjected to severe accidents.

Special form radioactive material wouldn't easily become a part of the environment if it were exposed, either because it is an indispersible solid or because it has been encapsulated and sealed. Other form material is just that, something other than special form.

The IATA Dangerous Goods Regulations relating to transport of radioactive medicals specify how much of an isotope (according to form) can go in what type of packaging.

Types of packaging for these goods include Type A and varieties of Type B.

Transport Index

A package's transport index is based on determining the maximum radiation dose from the package at one meter from the external surface of the package.

The transport index is then used by the transport companies, per IATA and ICAO regulations, to control radiation exposure to staff and members of the public. The required separation, segregation, and maximum transport index – both for individual packages and total packages – must all be complied with.

“The IATA/ICAO maximums [of transport index per plane], are still well within the safety limits because they have to consider that you don't know who's traveling. You don't know what condition those people are in. They may be pregnant, and they may be sitting above a package that has a transport index of three, and they may be sitting there for 12 or 15 hours,” says Ian Gibbs of the Australian Nuclear Science and Technology Organisation.

The limits per compartment and per airplane, says Gibbs, are conservative and ensure safety for the passengers on each plane.

Transport index limits are sometimes an obstacle to transporting radioactive medicals by air on smaller aircraft into smaller, country areas, says Gibbs. Other limiting factors include the infrequency of flights to such areas and the distance, and thus the amount of time, of transport.

Why Expedite?

Once passenger and worker safety is already ensured, Gibbs says, it is also crucial that the shipment make it to its destination in the most timely fashion.

Richard Vetter, the radiation safety officer at Mayo Clinic in the state of Minnesota in the United States, knows how important it is for his facility to get each radioactive medical shipment within a short time of its creation.

“If we don't get it in a timely fashion, then by the time we get it, it's useless to us because there won't be enough radioactivity left to be able to inject into the patient or to be able to add to the drug to make a radiopharmaceutical that we then inject into the patient,” Vetter says.

He explains further that the patient waiting for the shipment is usually expecting either treatment for something as serious as a cancerous tumor or a diagnostic test for cancer or other such serious ailments. Some patients will have traveled long distances and made financial sacrifices to get to the hospital. And they might not fully understand why a shipment with their treatment or test in it got turned away or left until the next flight.

Because of this human aspect, the need for timely delivery – beyond just safe delivery – cannot be overstated. Shippers of such goods understand that aspect and also their product-specific transport needs.

Chris Critch of MDS Nordion, a company that manufactures radioactive medicals, says that some of their products go through a radioactive decay of 1% per hour. So if that product were to be waylaid for a day, its efficacy would decrease by 24%.

“So that means the products have a very short shelf-life. And it makes them a little bit like perishable foodstuffs. It’s got a best-before date, and it’s usually the next day. Or it’s a couple of days later,” says Critch.

Because of that, Critch of MDS Nordion and other companies like Nordion, work hard to build a relationship with the carriers to track the shipments, resolve any issues, and get the shipment to its destination in time.

Taking Precautions

Airlines and authorities work hard to balance end user needs for radioactive medicals and the medicals’ short transport time frame with what they deem to be the maximum allowable risk for DG transport of radioactives by air.

Not all airlines agree on what that maximum risk is.

Some airlines will carry radioactive medicals on any flight where there’s space and aircraft limitations allow; others only carry radioactives onboard cargo planes. And yet others won’t carry them at all.

As head of the transportation safety unit of the International Atomic Energy Agency, Ron Pope is aware of the challenges end users and shippers face in trying to find a carrier for the goods.

He suggests that carriers and shippers alike would benefit from increased communication among all involved – from what the shippers expect or hope to achieve, to why the airlines may have chosen to restrict or eliminate carriage of radioactives.

“Rather than simply denying the transport of these materials, carriers and their pilots should communicate to the IAEA through their respective organizations (IATA, IFALPA) their concerns or problems, real or perceived, regarding Class 7 shipments so that solutions can be found and factual communication can be enhanced. Through this process, it would be possible for IATA and IFALPA representatives on the IAEA Transport Safety Standards Committee ... to work with IAEA staff to try to resolve these concerns or problems,” Pope says.

He seems to suggest that the best precaution with respect to radioactives is to gain a thorough understanding of the hazards from creation to destination.

“Added efforts may be needed to properly train pilots, crew, and freight handlers [to] ensure they understand the basis upon which radioactive materials are transported so they can more fully understand the risks posed and the steps that have been taken in the regulations to ameliorate those risks,” Pope says.

In that, he alludes to the body of information IAEA has for proper packaging (and more) of radioactives, IATA and ICAO regulations specific to air transport of radioactives, and competent-authority-specific regulations that can surpass the requirements of ICAO and IATA regulations.

As part of the Australian Nuclear Science and Technology Organisation that ships radioactive medicals, Ian Gibbs says he would like to see individual shipments of radioactive medicals somehow classified differently in the regulations to reflect to the carriers that these radioactives wouldn’t likely, by themselves, kill people.

“Safety to the public – look, at the end of the day ... the products that we’re shipping around are so dangerous that they are injected into people or they swallow them. My belief is that there should be a separate category for medical isotopes,” Gibbs says, though he acknowledges this as a topic for the IAEA and other regulatory bodies, not as his area of expertise.

Regulators have responded that their standard of safety is set higher than that because the dose rate at the surface of the package is important no matter how seemingly benign the contents may be in comparison to other radioactives.

Safety First, Always

In regard to surface dose rate, regulators point out that the amount of radiation to which a person is exposed in a given amount of time is cumulative.

Phil Eyre at the Canadian Nuclear Safety Commission (CNSC) reminds us to keep safety first. He says the CNSC has conducted research on transport workers showing that, even though doses are all within acceptable limits, radioactive medicals are no less a factor in exposure than other radioactives.

“Workers who’ve seen the highest debilitis are actually workers who transport medical isotopes,” Eyre says.

He also says, though, that the industry can be proud that exposures to radiation for workers and passengers appear to be low in comparison to what is allowed by law.

So, when workers follow the regulations and use their professional judgment, says Eyre, “I don’t think the transport poses a sizeable risk to the workers or even to the public. The regulations seem to be adequate, in fact, more than adequate, to protect both worker and public safety and, of course, the environment.”