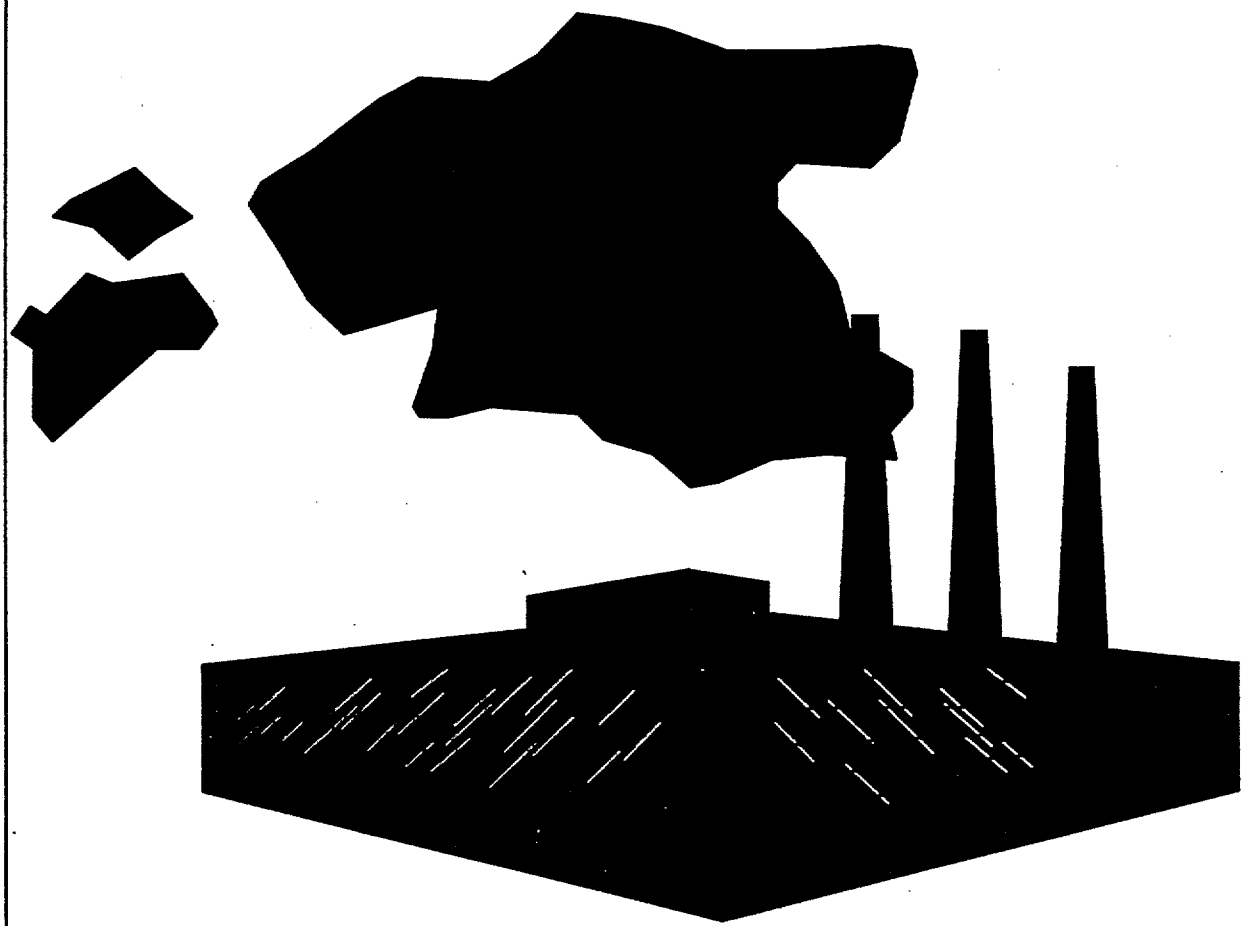
Integrated Hazardous Waste Management/Privatization



Silmet Rare Earth Minerals Processing Facility

Sillamae, Estonia

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RAS Silmet Technical Assistance Project

Closeout Report

Background

In December, 1995 the United States and Estonian government officials requested the United States Environmental Protection Agency (US EPA) to develop a project to assist RAS Silmet, the State-owned rare earth minerals facility in Sillamäe, Estonia, in addressing environmental issues at Silmet and their relationship to the company's impending privatization. US EPA agreed to work with the Estonian Ministry of Environment (MOE) and the United States Environmental Training Institute (USETI) to develop a short term technical assistance program aimed at working with RAS Silmet management to develop more economically efficient and environmentally sustainable waste management operations and practices within the plant. The program was to be staffed by a combination of USETI facilitators, private sector and government technical specialists. Ground and logistics support was to be provided by MOE staff as per the cooperative agreement between MOE and US EPA. USETI and US EPA agreed on a joint financial arrangement in February and a technical team was identified by early March. It was envision that the program would consist of three phases: a) A spring scoping mission to see the plant and speak with managers; b) An early Summer problem-solving workshop and c) A follow-up visit in September to review progress on implementation of selected waste minimization or pollution prevention activities. The project was to be completed by September 30, 1996.

April 18-28, 1996 Scoping Mission

The first phase of the mission began April 18, 1996. At this time no plant specific information was available to the technical team from either Estonian or the United States sides. The first portion of the visit was spent gathering basic information on the ownership, the privatization process, environment conditions and other factors relevant to RAS Silmet and the mission. An example of the type of information needed by the team is found in Attachments A-1 and A-2. The mission itself and the findings are discussed in detail in Attachment B. A verbal briefing on the initial findings of the mission was presented by the team on April 26, 1996. The briefing session was chaired by Ms. Steffanie Smith Kinney, US Embassy-Copenhagen and Prof. Ain Laane of the Tallinn Technical University for the Estonian side. An outline of the briefing was submitted as part of the briefing. The technical portion of the first mission report was tendered to RAS Silmet as a draft for comments in early June. As part of the first Mission, the Rector of the Silmae college was presented by US EPA with a suite of some thirty environmental tutorial software to be used enriching the ecological training program in the College and its affiliate in Tallinn. The technical team also discussed the possibility of securing private sector donated equipment for RAS Silmet environmental laboratory.

Silmet Workshop

Based on the major findings of the first visit, USETI developed an outline in May for the June workshop session. This outline was submitted to the Estonian side for comment at the end of May. Concurrently, US EPA contacted Mr. Pritt Saksing, thanking him for the technical team's reception and suggesting a conference call to discuss the inclusion of a Strategic Data Management Plan's segment in the workshop pending Silmet's receipt of guidance material sent by express mail from EPA. A return fax was received from Mr. Saksing agreeing to this approach and noting Mr. Igor Skachko, Silmet's data manager, would follow-up. Based on this and Anne Randmer's comments, a final agenda was developed and program development started by the team. A final attempt to secure further Estonian input was made June 13,1996 with no success. It was confirmed upon USETI's arrival on June 26, 1996, that the logistics for the Silmet Workshop were in order as proposed in the agenda (Attachment C).

On the morning of June 28, 1996, Mr. Pritt Saksing, called the Ministry saying he was cancelling the Executive Session part of the workshop, designed to foster interagency cooperation in RAS Silmet environmental issues. He was concerned about the impact of scheduling discussions about privatization and environmental liability issues since privatization has already been initiated with regard to Silmet. Upon being informed, the Mission's leadership attempted to contact RAS Silmet to no avail. During a courtesy visit to the Ministry of Foreign Affairs, contact was established with Mr. Saksing and an offer was made to brief RAS Silmet management at their convenience over the weekend on the proposed session contents and goals. If acceptable, the Executive Session could be rescheduled for Wednesday in Tallinn. The Mission leaders were advised of Mr. Saksing's availability starting 7:30 a.m July 1, 1996. The mission spent the weekend contacting United States and European company representative to discuss their relevant experience regarding environment and privatization issues.

The Mission met with RAS Silmet management at 8:15 a.m. at RAS Silmet offices. During the meeting, the mission was informed of the following:

- The management does not want to discuss privatization options for fear of jeopardizing a delicate situation by looking at environmental liabilities and the interrelationships between financing and restructuring.
- Privatization is in progress and they difinitely expect strong interest from Russia.
- An Estonian consultant has already completed and environmental audit and submitted it to the company. The material is considered sensitive business information at this time.
- The management visited a former E. German uranium ore supplier whose uranium mine and tailings were being remediated. A protocol was signed with the company for cooperation and the German government will supposedly assist with costs.
- The German Company will work to secure PHARE program funding.
- The MOE has released funding for waste lagoons' dike reinforcement.
- The management expects Swedish assistance with reinforcing the dikes.
- Apparent Russian financing available to build a port at Silmet as a separate Russian business venture. This would tie into the dam reinforcement plans.
- Silmet has completed a strategic plan for this year and it has received Board approval. This is aggressive and Mr. Saksing was pleased with the progress it represents.
- Silmet hosted a large Chinese delegation interested in supplying raw materials to Silmet.

After a review of the situation, the US team agreed to drop privatization as an agenda item for the Executive Session. In view of the situation outlined by the Director, the sensitivity of management to providing readily available information to the mission as technical input during the privatization process, and the natural reluctance of any management to initiate operational change during such a transition period, the Mission felt that it was best to focus on major environmental and occupational health and safety areas that would benefit the company (as well as other Estonian Government and corporate entities) irrespective of the privatization process. As such the Mission agreed to stay at Silmet for the day to conduct an abbreviated technical session that would walk the senior company staff through the following topical areas:

- Waste Minimization Process
- Health and Safety Planning
- Strategic Data Management Planning.

(See Attachment D for greater detail on workshop coverage.)

This was done from 10:00 a.m. to 5:00 p.m. on Monday, 1 July.

Vacys Saulys presented to the Rector of the Silmet College a core environmental library, prepared by US EPA for environmental technical assistance. Terrance Douglas of EET Corporation provided a box of technical literature on waste minimization and pollution prevention to RAS Silmet. Due to the abreviated nature of the Mission, the Executive Session was convened for following day in Tallinn.

The Executive Session was hosted from 2:00 to 5:00 p.m. the next day, 2 July, by the Ministry of Environment at its main conference hall. (See attachment E for Agenda.) The session was attended by 18 participants (See Attachment F for attendees) and was lively, punctuated by a number of questions. Attachment G consists of short summary notes provided by Kai Helm. The Majority of questions concerned the interrealation of privatization and historical\current environmental liability. Particular interest was expressed in what environmental issues and processes should be dealt with at Silmet before privatization (ponds and power plant among others) as opposed to left for after purchase by a new owner. While it was not presented during the session, Attachment H is provided as a representation of the privatization issues raised in these discussions.

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TRIP REPORT

LOCATION: Tallinn and Sillamae, Estonia

DATES: April 18 - 28, 1996

PARTICIPANTS

- Donald H. McAllister, Jr., Director, Business Development, United States Environmental Training Institute (USETI), Washington, DC
- Vacys J. Saulys, Deputy Director, U.S. EPA Region V, Chicago, IL
- Jeffrey Cone, The Hubb Group (Financial Consulting), Hastings-on-Hudson, NY
- Daniel Hurst, EET Corporation, Knoxville, TN
- Christopher McKeeman, Environmental and Safety Designs, Inc., Raleigh, NC

PURPOSE: United States Environmental Training Institute (USETI) led trip to Estonia to assess pertinent environmental, operational and privatization aspects of the RAS Silmet rare earth minerals processing facility in Sillamae, Estonia. The assessment team made an initial evaluation of Silmet's waste stream with an emphasis being placed upon steps that might be taken to reduce both the magnitude and toxicity of the waste stream. The team also discussed, in far less detail, Silmet's management system; the status of existing and historic waste sites; plant production and operating levels; solid/hazardous waste volume and content; disposal, recycling efforts and options; and possibilities for developing and establishing a hazardous management plan . Trip results will provide the basis for developing a workshop to be held in late June/early July to detail the results and develop actions that can be taken to address them.

MEETINGS **(in approximate chronological order)**

- Ain Laane, Head of the Chair of Environmental Protection, Tallinn Technical Univ.
- Allan Gromov, Head of Foreign Relations, Ministry of the Environment
- Teofil (Ted) Grochowski, Jr., Project Manager, B&W Nuclear Environmental Services
- Henno Putnik, Manager, Technical Operations, AS ALARA, Ltd.
- Anne Randmer, Director, Centre for Balanced Development Programs, Estonian Management Institute
- Priit Saksing, General Director, RAS Silmet

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- [illegible], Chief Engineer, RAS Silmet
- [illegible], General Director, RAS Silmet
- [illegible], Director, RAS Silmet
- [illegible], Environmental Director/Head of Laboratory, RAS Silmet
- [illegible], Production Director, RAS Silmet
- [illegible] Sin Mai, Head of Computer Center, RAS Silmet
- [illegible] Vodi, Finance Director, RAS Silmet
- [illegible] Bonamm, Press Secretary, RAS Silmet
- Stephanie Smith Kinney, Regional Counselor, Environment, Science and Technology, U.S. Embassy, Copenhagen, Denmark
- Victoria Middleton, Public Affairs Officer, USIS, U.S. Embassy, Tallinn
- David J. Karz, Economic/Commercial Officer, U.S. Embassy, Tallinn
- Robert J. Maushammer, Representative, US AID, U.S. Embassy, Tallinn
- Ambassador Nittenberg, AS ALARA, Ltd.
- Juri Valge, Board of Directors, RAS Silmet
- Viktor Grigorjev, Head of Technology Department, Ministry of Environment
- Matti Viisimaa, Head of Waste Management Unit, Ministry of Environment
- Janne Tedder, Finance Director, Estonian Hazardous Waste Management Unit (EOJKK)

I. EXECUTIVE SUMMARY

- With the support of U.S. AID (Tallinn) and in collaboration with U.S. EPA Region V, the above mentioned participants (the team) traveled to Estonia to meet with Estonian Government officials and, in particular, with managers and technical personnel from the RAS Silmet rare earth minerals processing facility in Sillamae.
- Despite briefings in Tallinn to not expect full access to the plant, the team was received by the General Director of RAS Silmet and, under the direction of Mr. Korb, the Assistant to the General Director, and Mr. Nosov, Environmental Director, was provided with a detailed description of RAS Silmet's facilities and activities and with physical plant tours of many of the facilities.
- In particular, the team concentrated on a) identification and review of past and potential radiological waste sites and sources; b) identification and review of four main hazardous waste streams from the power plant and production processes; c) discussion of other possible hazardous waste sources; d) review of air emissions from the power plant; e) review of two regulated water discharges.
- The team identified issues and areas where pollution prevention would be possible; where production or operations processes could be altered to affect pollution and waste toxicity; where EH&S plans would be beneficial to the operation of RAS Silmet.
- Principle recommendation is for the development of a detailed waste management plan at RAS Silmet.

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[illegible] Phase I Plant [illegible]
[illegible] specialists [illegible]
[illegible] of the old uranium mines do investigate [illegible]
[illegible] to areas concerning worker effect practices and [illegible]
[illegible] were able to get a basic understanding of the [illegible]
[illegible] the operational, financial and market hurdles they are confronted with. While this was not nearly detailed enough to opine on the company's viability, findings in [illegible] cases, indicated the new management of RAS Silmet is making serious efforts to keep RAS Silmet operating and is willing to listen to advice with regard to EH&S and environmental management issues.

- Other issues regarding privatization of RAS Silmet, the "spin-off" of the hazardous waste ponds, and the company's relationships with various Estonian Government organizations remain to be settled.
- Possibilities exist for assisting RAS Silmet with computer and MIS upgrades it is contemplating.
- The team recommends RAS Silmet as a perfect candidate for the EBRD's Turn Around Management (TAM) program.
- A follow-up workshop addressing the team's finding and recommended actions is being planned for June/July.

II. CURRENT and PROPOSED ACTIONS

- Bring Silmet and Estonian Government managers together to discuss environmental and management issues at Silmet and in the Sillamae area.
- Discuss privatization issues. What does Government really want? What would a potential international buyer look for? What would be environmental concerns of a potential buyer and why would they exist? Detail the positive effects of a decent environmental management plan.
- Lay groundwork for the development of a Silmet hazardous waste management plan that will address waste streams and provide specific pollution prevention & waste minimization options.
- Lay groundwork for upgrading EH&S practices and equipment. Prioritize issues, identify "quick fix" options and potential costs for short/long term.
- Assess computer needs. Provide guidance where possible with regard to hardware/ software options and assistance with negotiations of purchases.
- Discuss possibilities for Silmet inclusion in EBRD's TAM (Turn Around Management) program.

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SILMET FACILITY (ESTONIA) POLLUTION PREVENTION PROJECT
PRE-VISIT QUESTIONS

1. Is there available, or can a process flow diagram be made available prior to the site visit?

2. If a process flow diagram cannot be made available or does not indicate inputs and outputs, can inputs (i.e., raw materials) and outputs be made available for each process operated currently and in the past? Outputs should include by-products, wastes, recyclables, and products.

3. How are inputs supplied to the processes? Are suppliers established without modification?

4. What is local hydrogeology?

5. What current solid and hazardous waste (not mixed or radiation waste) disposal/treatment options, if any, are available in Estonia? Are they government or privately owned and operated?

6. Are current processes expected to continue operation into future or are process/production changes inevitable? If processes and/or end products change, explain how and provide information on each pertaining to questions 1 3 above.

7. Has Estonia promulgated solid/hazardous waste regulations? Radiological Waste regulations? What current Estonian regulations apply to the facility regarding environmental responsibility and management? Can we be provided with a copy of these regulations?

8. What current investigatory technology is available in Estonia?

9. How will photographing of the facility be handled?

To: Jay Mcallister
USETI

From: Jeffrey Cone JC

Date: March 25,1996

RE: Estonia pre-trip questions

I have limited my focus to non-environmental areas, leaving that area to Chris et al to focus their attention. I will rely on your fine editing skills to complie the final list for forwarding to the relevant parties in Estonia.

I. General Background:

- Background on Government and Bureacracy

  key political players in current government;
  key bureacratic players / Ministry(s)

- Privatization Organization

  efforts to date
  organization and its leadership
  power and authority
  role, if any, in Silmet project

- Legal structure for privatization
  foreign ownership rights / limitations / joint ventures
  summary of current law
  any Western (US) firms with equity ownership in Estonian concerns

II. Silmet Ownership and Management Structure

  who currently owns Silmet? what form? (common, preferred stock, warrants etc.)

- Board of Directors

  members, background summary, their individual responsibilities and areas of expertise, term of office (time remaining for each)

  frequency of meetings (copies of minutes from last few)

- Management Team

  members, background summary, their individual responsibilities and areas of expertise

  organization chart by departments with headcount breakdown

III. Business Overview

- Sales and Marketing

  Top ten customers for past three years with breakdown by product (volume, $value) sales method: spot, long term contract, via third party Nissho Iwai?

  Top ten suppliers for past three years with breakdown by product (volume, $value) purchasing method: spot, long term contract, via third party Nissho Iwai?

- Production

  step-by-step of current production process

  facility production capacity by product vs. actual for past three years and monthly for last year

  Breakdown of all production related equipment by product line: when acquired, purpose, capital expenditure, depreciation and maintenance schedules

  Breakdown of all other fixed assets (warehouses, rolling stock etc.): when acquired, purpose, capital expenditure, depreciation and maintenance schedules

- Personnel

  Headcount breakdown by all functional areas: production, sales/marketing, purchasing, administration, etc.

  direct compensation, benefits (cost) broken down by functional areas

- Financial Statements

  Profit and loss, balance sheet and cash flow statements for past three years

GENERAL INFORMATION

RAS Silmet is located in Sillamae, in the Northeast corner of Estonia near the city of Narva and the border with Russia. The region is 95% populated by ethnic Russians. The city of Sillamae and the RAS Silmet facility were closed to outsiders until after 1989. The city is almost completely inhabited by ethnic Russians, 25 % of whom own Russian passports and most of whom do not speak Estonian, a condition for Estonian citizenship. Sillamae and the area have been and, to a lesser degree, still are very dependent upon Silmet for employment and support services.

Silmet was originally formed as part of Stalin's "atomic shield", under the Ministry of Energy (Mid-Range Machinery and Engineering) to produce Uranium from shale ores mined on the Silmet site. In 1953, Silmet began importing higher concentrate ores from East Germany, Hungary and Czechoslovakia. These came in by train right to the facility. In 1976, the facility began to produce rare earth minerals such as Tantalum, Titanium and Niobium from Loporite concentrate imported primarily from the Kola Peninsula in Russia. In 1990, all Uranium production was stopped at Silmet and, in 1992, the plant ceased all treatment of Loporite. Silmet now produces a) various concentrates of rare earth materials as both oxides and fluorides and b) rare metals such as Niobium (in oxide and metal forms) and Tantalum (as Tantalum Oxide).

In addition to its mineral production, the company plays other roles in the Sillamae region. The city of Sillamae has approximately 20,000 residents, 99% of whom are ethnic Russians and most of whom have been dependent upon Silmet for employment. Silmet still provides steam heat and electricity to the city, which utilizes 80% of the output of Silmet's shale oil fired power plant (the remaining 20% going to the factory). We also were told that the Silmet power facility is tied-into the Russian power grid. Silmet is also the major taxpayer to the city of Sillamae and in the area. Because of this major relation to the town and surrounding area the Director General of Silmet plays an active role in the community and has social, economic and political responsibilities unusual for most enterprises.

At its peak, Silmet employed 6500 workers (current employment is 1,300 - 1,600 with 900 handling direct production in three shifts and with 300 maintaining the power facility servicing both the plant and the city's needs) and had support operations of all sorts, including a major vehicle pool (up to 350 vehicles), a municipal wastewater treatment facility, greenhouses for vegetable production, and a construction company, amongst others. The construction company was used to build a new facility located west of the current location, but construction was apparently halted in 1989 prior to completion due to a lack of funds. Although Western firms have visited the site as a possible production facility, it remains unoccupied and this team did not visit the site to asses its current condition and/or stage of completion. In addition, the company was in the process of building a new power plant, adjacent to the facility, which was sold to a Russian investor (supposed cost of Rubles 30 million and supposed sale price of Rubles 300,000; currency rate to the USD is unknown).

Following Estonia's independence and the transfer of ownership to the State, "Silmet" privatized many of these, resulting in Silmet's shrinkage to 230 hectares from 670 hectares. We could not get any details on how these sales were made and the impression was that any funds coming from the sales/privatizations did not come back to Silmet. In fact, there is the distinct view at Silmet that the national government has no interest in the facility.

There appears to have been little outside or Government support for the facility over the past few years. From 1991-1995 there was little or no investment in operations and maintenance at the plant. As a result, equipment appears old and run down. One help was apparently a waiver of taxes owed to the national government from 1992-1995. These are, apparently, being called in now that the company has some sales and cash flow and this has left questions about any real interest in supporting the company. It was also expressed that, for many other companies being privatized, debts owed for power were waived with the exception of Silmet (which, despite its power facility, is a net importer of power from the local grid) which received only a rescheduling of power debts. We could not confirm this but such stories, whether true or not, contribute to a general feeling that Silmet is a second class corporate citizen in Estonia.

Privatization is clearly an issue for Silmet. Yet, nobody is very sure what it means. Questions abound with regard to the status of Silmet's hazardous waste ponds. AS ALARA, Ltd., a government owned radioactive waste management company, is due to take over the management of the ponds. Although this should help remove some of the environmental risks at Silmet prior to privatization, questions remain regarding this agreement: When will the transfer take place? What will Silmet then do with its waste, particularly ash from the power plant? Will Silmet's liability regarding the ponds be totally removed? Leaching from the ponds also remains a major issue to be dealt with.

Several questions were asked by Silmet personnel about Silmet's power plant and whether it should be privatized, separate from the production plant itself. The power plant is a major cost to Silmet in the form of upkeep. Yet, it is also important to the Sillamae region (another story has it that power bills for heating Sillamae are not paid to Silmet and the feeling is that the Government should absorb these because of the social benefit provided regionally).

The details of many of these individual transactions and, in particular, those regarding facilities like the newer power generation facility, are important because of the potential impact the terms may have on the current operations and the prospects for attracting additional capital and investors. Answers should be gained.

MANAGEMENT/FINANCE SUMMARY REPORT

I. INTRODUCTION

Although the details of environmental, pollution prevention, waste minimization, and health & safety issues will be addressed separately in this report, a resolution of these issues will be a critical element in preparing Silmet for privatization and attracting new capital. This "management/finance" discussion will focus on what was only a preliminary commercial assessment of the enterprise. The reader should note that the topic of privatization was a secondary goal of the mission and therefore only limited time was set aside for this portion of the agenda. This summary is largely based on general discussions held with: Mart Laanemae, Head of Sales and Marketing, Toomas Vodi, Director of Finance and Igor Skachko, Head of Computer Center.

II. BACKGROUND

The company is a joint stock company, 100% owned by the Government of Estonia through the Ministry of Economy.

Silmet represents a classic model of a Soviet processing facility attempting to evolve from a production driven mentality to a self sustaining, profitable enterprise in an emerging, market driven economy. Complicating these efforts are some unique Estonian twists in the geopolitical sphere that make this exercise more than just a simple cost- benefit analysis.

Silmet apparently operated from the outset as a self-contained, fully integrated entity similar in many respects to the so-called "company" towns prevalent during the 1800s in the United States. The company provided services such as heat, electricity, hot water and municipal waste treatment to Sillamae, a city with a population of approximately 20,000. At its peak of activity, Silmet had in excess of 5,000 employees handling the processing and production of rare earth metals (oxides and fluorides), niobium (ingots and powders), tantalum, filtration materials, respirator masks in addition to power generation, municipal waste treatment. According to Priit Saksing, General Director, Silmet remains the largest employer and taxpayer and key to the future prospects of this industrial region.

III. MANAGEMENT STRUCTURE

Prior to independence, general managers at Silmet enjoyed long tenures: only three in 46 years. Since independence, Silmet has had three management teams in the past five years with the previous team forced out by the Board of Directors amid a cloud of suspicion of mismanagement. The impression was constantly given that, until the recent team took over in late 1995, none of the past management teams has really cared about

the fate of Silmet nor have they made efforts to address the company's precarious position.

Adding to this recent period of management instability is the fact that the General Director is, by tradition, heavily involved in local matters in addition to managing Silmet. This tradition apparently continues today and has a significant impact on the amount of time the managing director can devote to the day-to-day running of this enterprise.

The General Director is appointed by the Ministry of Economy and reports to a Board of Directors. The Board has the authority to replace the General Director and his management team if it is not pleased with their performance and in fact took this action in the case of Mr. Saksing's predecessor. The Board meets monthly and consists of representatives from the Estonian government, academia and the business community. With the exception of Juri Valge, whom the team met during the debriefing meeting in Tallinn, we have neither a listing of the other Board members, nor have had the opportunity to benefit directly from their perspective concerning the current situation.

At the operating level, Mr. Saksing has appointed five directors with responsibilities for the following areas: 1.) Production (Aleksandr Gurjanov; 2.) Sales and Marketing (Mart Lannemae); 3.) Finance (Toomas Vodi); 4.) Personnel and 5.) Administration. The heads of the departments meet together on a weekly basis to coordinate their activities, although it was unclear from our discussions just how effective are these meetings really are. On the surface, though, the management team appears to be making efforts to address Silmet's business and other problems.

IV. PRODUCTION

Mr. Gurjanov attended only the first day sessions. The balance of our time was spent with deputy heads in charge of the following areas: rare earth metals and niobium production, the power plant, laboratories (including environmental issues and acid storage facilities). With the exception of some laboratory equipment, including a very dated personal computer, all equipment seen during the facility tours appeared to be of former USSR origin. Given the strategic nature of this facility, we can only assume that the equipment represented the latest technology of its time when installed. With the exception of a boiler being rebuilt, the facilities appeared to lack any evidence of any new equipment since about 1989 and a general lack in maintenance work if it involved real capital outlays. Repeatedly, opportunities for cost effective improvement would be noted by our technical team and the response would be that they were doing their best given the limited resources. Several people noted that the entire facility had seen no maintenance since 1989 (in many cases, the implication being that Russia took better care of the facility, but also reflecting a general misunderstanding of some of the economic changes that have taken place since the breakup of the former USSR). All of the production areas merit a closer technical assessment in the future.

Current production of niobium and tantalum is running at about 20% of capacity. These are both light, strong and flexible metals. It was explained that a key aspect of both is their heat resistance (niobium melts at 2,800°C and tantalum at 3,000°). Both are used in the production of integrated circuits, rocketry, reactor cores, pipelines for the extreme north. World niobium production is apparently 2,000 tons and, at its peak, Silmet produced almost 800 tons for the former USSR. With the break-up of the former USSR, both raw materials and finished goods orders went away.

One key issue Silmet must face is its final product. Apparently, the old guard at the facility insists upon producing products such as 99.99% pure niobium (produced in an electric arc furnace). "Better than anything produced in the United States" we heard. Yet, the market apparently does not want pure niobium, which is expensive. Rather, 94 - 95 % purity levels are fine because the niobium is mixed with iron to form an alloy used in steel making. The marketing department is actively working on this issue with the production department. Similarly, the opinion was expressed that Silmet needs to alter its tantalum production away from tantalum hydroxide which is not totally useful because it needs to be reforged for further work (see Sales and Marketing below).

It was mentioned that the future lay much more in rare earth materials than in the tantalum/niobium areas. Rare earth production capabilities run at 50-60% capacity. Most products go to glass manufacturing, batteries and to electronics. Lanthanum is used to make glass with high refractory capabilities and cerium is used in the manufacture of tinted or colored glass. Yet, Silmet will need to enhance its production capabilities in order to acquire greater flexibility in creating new rare earth materials, in marketable quantities, to meet market demands. Approximately 900 of Silmet's total workforce is employed in production areas. The remainder are administration or support personnel.

VII. SYSTEMS

Under the direction of Igor Skachko, Silmet has apparently set aside $200,000 to purchase new computer hardware (35 Pentium based PCs 75/120 MHz) and application software supplied by Damgart International, a Danish company with IBM as a major shareholder. Currently, they are working with forty old PCs which could be similar in age to the vintage machine seen in the laboratory. Installation is scheduled to begin in September 1996. We have offered to assist directly in the negotiations with third party vendors covering equipment purchases, software licensing, maintenance and support agreements as well as assisting in designing the system requirements. It remains unclear where Silmet has found $200,000 for computer equipment given the state of the production facilities and company's finances.

VIII. SUMMARY AND RECOMMENDATIONS

The discussions to date have only scratched the surface of what is needed to make informed recommendations about the privatization options for Silmet. The company appears to have a committed management team and enthusiastic workforce in place that is thin on financial resources and personnel with market driven operating experience. The facilities themselves have suffered from the lack of sufficient capital for maintenance and new equipment investments. The result is production facilities that are inefficient and continuing to pollute the surrounding environment and no plan in place to correct the situation. The lack of a Western style management information system will continue to hamper the transformation of Silmet into a truly viable enterprise that will attract serious investor interest.

The next step should focus on quantifying Silmet's environmental and financial liabilities. Information gathered on this visit should help formulate a limited action plan and provide the basis for a workshop focusing on cost effective corrections of some of the environmental and worker safety problems uncovered. It is critical that a systematic Phase II environmental study be completed to completely document the present situation. This document together with the current financial liabilities can then serve as the bases for discussions between the relevant government departments to resolve what liabilities will be assumed by AS ALARA Ltd., the government and which will remain with Silmet. Silmet's role in managing the local power plant will also need to be addressed. These discussion will also hopefully serve as a basis for fostering improved communications between Tallinn and Silmet that have been apparently lacking until now. Silmet is also an excellent candidate for EBRD's Turnaround Management Program (TAM), which is designed to assign a team of Western experts in all phases of oper-ations to assist for a one year period the existing staff in their respective areas and help develop a strategic plan for the company. This expertise is provided at no cost to the company. The final area involves securing sufficient working capital to reduce the day-to-day survival pressures and arrest the steady deterioration of the production facilities.

ENVIRONMENTAL/HEALTH AND SAFETY REPORT

I. INTRODUCTION

Environmental and Safety Designs, Inc. (EnSafe) and EET Corporation (EET) teamed to review the RAS Silmet rare earth processing facility in Sillamae, Estonia. The goal of this survey was to identify environmental concerns including general characterization of solid and hazardous waste, quantification of environmental process and accidental discharges (i.e., air, surface water, soil, and groundwater), and operation s process identification and flow so as to provide facility management with immediate and long-term environmental solutions.

After gathering this information, EnSafe and EET were to assist RAS Silmet with the identification of opportunities to decrease the toxicity and/or volume of waste generated or discharged to the environment. These recommendations are included within the following sections of this trip report.

Also contained herein is a list of employee health and safety concerns EnSafe and EET identified while conducting the environmental survey. These concerns include industrial hygiene, construction safety, and hazardous substance management.

II. WASTE MANAGEMENT

A Waste Management Plan detailing the quantity, composition, source and potential treatment of all waste streams generated at the RAS Silmet Plant should be prepared. This plan would serve as the basis for future pollution prevention planning as well as ongoing environmental remediation at the site. The plan should provide an inventory of historically produced waste in addition to addressing waste streams currently being generated.

The key to a Waste Management Plan is staying abreast of individual process flows and flow modifications, process inputs, and product/waste outputs (e.g., air and water emissions, marketable products, solid and hazardous waste, by-products, etc.). Following determination of these constants, a plan capable of effectively managing each can be written and implemented.

The following paragraphs discuss the waste types EnSafe and EET had the opportunity to review and discuss with Silmet management. This study does not represent an exhaustive or complete effort. It does represent, to best of the team members ability, the information presented by RAS Silmet during the three day facility investigation.

A. Radiological Waste

Depository

Although the focus of the USETI mission to Silmet was environmental, health, and safety issues associated with ongoing production processes, the environmental focal point of the facility is the 330,000 m^2 waste depository located on the waterfront of the Gulf of Finland. The depository contains some 8 million cubic meters of wastes, primarily uranium mill tailings, ash and process water from the oil-shale power plant, and process residues from the rare-earth metal processing and extraction facilities. There are monitoring wells around the ponds but questions exist with regard to their design and upkeep.

The depository has been investigated extensively by personnel from RAS Silmet, Tallinn Technical University, Estonia Ministry of Environment (MOE), and the Swedish Radiation Protection Institute. An investigative report entitled *The Content and Environmental Impact from the Waste Depository in Sillamae* was published by Hans Ehdwall, et al. Restoration of this site will be complicated by its proximity to the Gulf of Finland and will first require the design and construction of a suitable storage facility for waste currently produced by Silmet. Recently, terms for additional restoration work (Phase II) were drawn up but, with the exception of a small amount for reinforcing the dikes, the program was rejected for lack of government funding.

Rumors exist that Silmet is being considered as a site for a regional hazardous, or radioactive, waste depository. It was mentioned the ponds themselves could be expanded and an old port that used to serve the plant site in the 1930's could be expanded to handle waste ships. The port area is alongside existing dikes for the waste ponds. This idea was discouraged by the team because of the documented present and past leaching of depository waste constituents and erosion of depository walls.

The leaching of depository waste constituents was not defined or quantified by RAS Silmet but may be the most immediate and environmentally impacting operation conducted at the facility. Several ideas were discussed regarding the remediation or response to the leaching of constituents from the depository; including pump and treat, recovery trench management, shoring and reformation, etc. Each of these ideas would require more investigation and research before implementing.

Rare Earth Metal Processing Residue

At current operating levels, approximately 80 tons per year of rare earth metal processing residues are disposed into the depository. The radiological component of this residue includes approximately 4.5% thorium, as well as significant quantities of radium and uranium. This waste is a necessary by-product of the extraction process. However, a more suitable treatment and disposal alternative should be investigated.

Cesium Sources

Approximately 70 cesium sources used for research at the facility were collected several years ago and secured in an underground bunker, which is fenced and has had electrical power disconnected to reduce the risk of removal and proliferation of the sources. The activity and form of these sources was not obtained. A detailed inventory of this activity should be obtained and tracked by both RAS Silmet and the Estonia MOE until a mutually suitable plan for final disposal is prepared. At present, if appropriately secured, these sources may not present a threat to human health or the environment. If allowed to remain, this conclusion will not apply.

Laundry Sludge

Residues and wastewater from the plant laundry are currently sent directly to the wastewater treatment plant. It is likely that appreciable quantities of thorium, radium, and uranium are present in this residue. Although this radioactivity is likely to be very small when compared to levels in the depository or process residue stream, further investigation of activity levels in the wastewater treatment sludge, as well as other hazardous constituent levels, should be investigated.

B. Hazardous Waste

Prior to visually inspecting each hazardous waste generating process at RAS Silmet, EnSafe and EET reviewed waste stream-specific analytical and volume data presented by facility personnel. The data provided information on four waste streams identified by RAS Silmet personnel, and included:

- Shale ash process water,
- Niobium pentoxide process water,
- Tantalum hydroxide process water, and
- Rare earth process water.

The shale ash wastewater is generated at a rate of 100,000 tons per year. The ash sluice uses 11,000 m3 of recycled water coming from the ponds. Only 50-100 m3 of fresh water is required daily. The waste is characterized as caustic (pH 12.5) and contains no other toxic constituents or hazardous properties. This waste stream is generated from the processing and use of shale oil as a fuel source to operate the facility s power plant. Fly and combustion ash are mixed with water for discharge to the depository.

The niobium and rare earth process wastewaters are characterized as acidic (pH <3) containing trace amounts of heavy and other metals. These waste streams are generated from the metal extraction processes employed on raw material. The total combined amount of rare earth process water generated is approximately 8 cubic meters per day. Technologies have pretty much removed solid waste from the niobium pentoxide and tantalum hydroxide processes.

V. SALES AND MARKETING

Prior to the appointment of this management team, these functions were handled by a variety of different departments and had been non-existent under Soviet ownership. In addition, Silmet's new management team apparently inherited an empty order book and no supply contracts for raw materials. Initial efforts concentrated on building an order book. This was largely accomplished with a supply agreement with Nissho Iwai that apparently carries Silmet through 1996. Raw material contracts were similarly negotiated with Russia to meet production requirements through 1996. The Sales and Marketing area has a staff of four. Key areas of focus are building on Silmet's reputation for rare earth metals and a greater emphasis on alloys production. Applications include glass manufacturing (UV resistance, tinted lenses, etc.) and batteries for rare earth metals. 50-60 percent of current production goes to Japan (Nissho Iwai exclusively), with the balance spread between Canada, America, Belgium, Germany and Italy. It was mentioned that opportunities may also exist for niobium alloys for magnet and transformer producers.

Niobium production is an area of conflict with the production staff preferring to deliver pure niobium per the Soviet model, whereas Sales and Marketing sees greater potential for niobium alloys that command higher prices that pure niobium. In addition, Brazil is globally the low-cost niobium producer and Silmet cannot compete directly with its cost structure (one help to Silmet is the fact that it does not factor environmental costs into its overhead). The push to more alloy production is further hampered by a "chicken and egg" syndrome. Because demand is relatively small, no product development function has been established even though adequate laboratory facilities exist.

The markets for Silmet's products are, in general, characterized by many end-users, each with relatively low volume demands. As a result, Silmet largely deals with a series of individual distributors in Western Europe and North America that meet the periodic material demands of the end-users. This system will limit Silmet's ability to fully take advantage of higher market prices resulting from the planned shift to higher value-added products and offers an excellent financial upside should Silmet identify an operating investor with its own captive distribution system.

VI. FINANCE

The finance function is organized into four departments: 1) Finance; 2) Controller; 3) Systems; and 4) Economics. Like the Sales and Marketing area, the finance area has been built from the ground up since none existed during the previous Soviet ownership. Lacking financial assistance from the Government and the commercial banks, emphasis has been on short-term financial survival. This has resulted in very limited time to contemplate long-term issues. Although the economics department will issue a study in June, it was indicated that any investor must expect a to make a substantial investment ($20 million+) to put the company on a proper foundation. This figure does not include outstanding issues like taxes due for prior years (1992-1995) that must be paid in two years, bad debts from the breakup of the Soviet Union ($1 million estimated) and the cost of historic environmental polllution and the fines now generated by current production. It was indicated that Silmet might have the potential to produce revenues of $50 million if it has an adequate capital base.

Under the Nissho Iwai contract, Silmet has a quarterly netting arrrangement whereby "Moscow" balances raw materials supplied by Russian suppliers to Silmet against finished products shipped to Japan with a due to/due from Silmet resulting from the calculation. All invoices are in Dollars.

D. Water

Two regulated discharges are conducted at RAS Silmet. The first discharge is regulated but not fined and includes the leaching of water form the seaside wall of the main depository. Water and depository constituents are leaching through the wall of the depository into the Baltic Sea. This discharge is regulated and requires a permit, but cannot be quantified. The inability to quantify this release has made it impossible for the MOE to levy fines to RAS Silmet under its current regulatory format.

The second permitted discharge involves a mazut fuel oil release. The fuel oil released below ground thereby affecting soil and groundwater. An estimated 22 cm of pure product is floating atop the groundwater. Due to this release, fuel oil was introduced into the wastewater treatment facility s discharge pipe where it is eventually transported to the Baltic Sea. As such, fuel oil is being inadvertently discharged to the sea.

RAS Silmet pays a quarterly permit fee and fine for this discharge. This process is similar to the permitting required of air pollution sources. RAS Silmet's fees and fines for wastewater equal less than 70,000 Krooni per quarter.

III. REMEDIAL INVESTIGATION

Several areas and matters of environmental concern were visited and discussed during the RAS Silmet facility site visit. As such, EnSafe and EET discovered areas in which investigation and/or remediation activities should be conducted. A discussion of the investigation process and the areas requiring additional attention are contained in the following paragraphs.

A. Phase I/II Investigation

Prior to the purchase of property or real assets by a US or Western European union company, it is probable that an investigation of the facility's compliance and environmental status would be requested. Such an investigation is conducted in two phases; I and II.

A phase I investigation includes a site reconnaissance, records and operations review, historical property and adjacent property use determination, and regulatory agency interviews. The purpose of the phase I investigation is to provide a historical and present picture of the facilities (and adjacent properties) operations and the potential environmental liabilities associated with its purchase. A phase II investigation is conducted to confirm or dismiss information obtained during the phase I.

Phase II investigations are likely to include sampling environmental media to determine the existence or nonexistence of contaminants, the extent of impact, and current and/or future fate and transport of contaminants.

It is likely, upon privatization of the RAS Silmet facility, that potential purchasers will conduct or request a phase I and/or II be conducted prior to its purchase of the subject facility. It is important that RAS Silmet be prepared for such an investigation, including record and data maintenance, permit compliance, and environmental due diligence.

Depository

Further remedial activity at the Silmet depository should be based on historical information which has been archived or published. Following identification and implementation of a more suitable waste treatment and disposal alternative for ongoing processes, remediation at the depository should focus on neutralization of acid and alkaline ponds, minimizing leaching of heavy metals and radionuclides, securing the depository wall against erosion, and capping the depository to minimize runon, runoff, and airborne dispersion of particulates contaminated with uranium, thorium, radium, and other radionuclides.

Uranium Mine

Between 1948 and 1953 alum-shale was mined on-site for uranium production. In 1953, this mine was abandoned in favor of higher quality shales which were imported from eastern Europe. Recently, the shallow mine was filled in with old ore stockpiles located in the mine vicinity. Significant subsidence has occurred in the mine area, with the presence of a fault line approximately 50 meters in length evident at the ground surface. Various ore deposits are also scattered on the ground surface in the vicinity of the mine. Further investigation regarding the need for an engineered closure and capping of the mine area is recommended.

Oil Release

Based on a review of past investigatory action, additional investigation would be required before an adequate extent determination could be provided. Currently, no attempt has been made to recover the pure product and the fate and transport mechanisms of the release have not been fully determined.

The pure product may be recoverable. If true, reuse or sale of the recovered product may be viable. An estimate of the amount of fuel oil released or duration of the release is unknown. As such, and including the fact that extent of impact has not been adequately determined, no estimate of recoverable product can be calculated.

IV. HEALTH AND SAFETY

Several areas of concern were noted regarding worker health and safety practices and physical environment. These concerns included:

General housekeeping. Lighting throughout most of the buildings was sparse, inviting physical injuries from slips, trips and falls. Poor lighting, coupled with

insufficient working and walking surfaces increase the risk to worker health and safety.

Worker safety signage and labeling were sporadic. Basic hazard communication training would be very valuable to facility personnel and should be incorporated into daily routine.

Personal protective equipment (PPE) requires upgrading and personnel training before use. Some facility personnel were seen donning dust masks (a form of respiratory protection) and work clothing while others, in the same area, wore no PPE. The PPE program did not appear to have structure nor did the PPE appear to be sufficient for all tasks. Industrial safety engineering practices did not appear to be instituted consistently throughout the facility.

Personal and area industrial hygiene air sampling was not employed. RAS Silmet lacks the monitoring equipment to conduct the much needed surveys. Monitoring should be conducted in the acid buildings, the bulk storage area, the power plant, production laboratory, compressed gas cylinder storage area, process facilities, and the depository.

Hazardous substances used in the processing of niobium, tantalum and other rare earths can cause environmental and personal damage if used. Because RAS Silmet does not currently have adequate facilities to ensure personal or environmental damage, renovation of existing facilities or addition of new facilities is recommended.

Two areas that require attention include the bulk acid and ammonia storage area and the acid building storage and process areas. Both facilities require upgrades to containment, labeling, inspection, and operational systems.

RAS Silmet is very aware of their need to upgrade the level of personal and area monitoring and the need for increased safety awareness. The current problem appears to be lack of information for implementation and funds.

ATTACHMENT C

DRAFT Training Outline

RAS Silmet
Sillamae, Estonia
July 1, 1996 to July 3, 1996

Tuesday, July 2, 1996

9:00 to 10:00	**Waste Management Concepts (Cont'd)**	McKeeman
	Organizing for Effective Waste Management Waste Characterization Waste Storage and Transportation Waste Treatment Technologies	
10:00 to 10: 15	Break	
10:15 to 12:00	**Waste Management**	McKeeman
	Review of RAS Silmet Waste Streams Discussion of Current Issues In Waste Management at RAS Silmet Case Study: Community Hazardous Waste Management Scenario	
12:00 to 1:15	**Lunch**	
1:15 to 3:15	**Building A Waste Management Plan**	McKeeman
3:15 to 3:30	**Break**	
3:30 to 4:30	**Introduction to Pollution Prevention**	Douglas
	What Is Pollution Prevention (P2)? What Is Waste Minimization (WMin)? Why Consider P2 and WMin? Developing a P2 and WMin Program Cost/Benefit Analysis RAS Silmet Opportunities	

DRAFT Training Outline

RAS Silmet
Sillamae, Estonia
July 1, 1996 to July 3, 1996

Monday, July 1, 1996

1:00 to 1:30:	**Introduction**	
	USETI Introductions and Opening Remarks	McAllister
	RAS Silmet Introductions	Saksing
	Review of USETI Objectives During April Visit	McAllister
	Summary of Key Observations from April	McAllister
1:30 to 2:30	**Overview of the Relation Between Corporate Environmental Management and Privatization**	
	Marketability of RAS Silmet for Privatization	Cone
	Privatization Alternatives	Cone
	Viability as a Waste Depository	
	Viability of Power Plant Privatization	
	Factors Influencing Privatization	Cone
	Competitiveness (excluding environmental factors)	Cone
	Environmental factors	
	McKeeman	
	Health and Safety Performance	Douglas
	Utilization of External Support	Cone
	RAS Silmet Participation in *Turn Around Management* (TAM) Project	
2:30 to 2:45	**Break**	
2:45 to 4:00	**Waste Management Concepts**[1]	McKeeman
	Waste Management as a Process	
	Effective Planning for Waste Management	
	Integrated Pollution Prevention (P2) and Waste Minimization (WMin)	
	Compliance Assurance and Reporting	

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[1] All the topics listed under Waste Management headings with Chris's name next to it were pulled out of the air after looking at Jay's proposed agenda.

DRAFT Training Outline

RAS Silmet
Sillamae, Estonia
July 1, 1996 to July 3, 1996

Wednesday, July 3, 1996

9:00 to 10:15	**Pollution Prevention Case Study**	Randmer
10:15 to 10:30	**Break**	
10:30 to 12:00	**Occupational Safety and Health Management**	Douglas
	Commitment To Protecting Worker Health Objectives in Managing OS&H Recognizing the Hazard Hazard Controls and Effective Work Planning Information Resources Benefits of An Effective Occupational Safety and Health Program RAS Silmet Issues and Proposed Solutions	
12:00 to 1:30	**Lunch**	
1:30 to 3:30	**Building An OS&H Management Plan**	Douglas
	RAS Silmet Management's OS&H Objective(s) OS&H Responsibilities and Resources Hazard Identification and Trend Analysis Hazard Analysis and Prioritization Hazard Control and Reduction Writing the Plan Communication and Feedback	
3:30 to 3:45	**Break**	
3:45 to 5:00	**Close Out**	McAllister/Nosov
	Review of Workshop Objectives Implementation Assistance Draft Objectives for September Strategy for Follow Up	

DRAFT Training Outline

RAS Silmet
Sillamae, Estonia
July 1, 1996 to July 3, 1996

4:00 to 5:00	**Objectives for July 2nd and 3rd Workshops**	
	Specific Areas of Interest for RAS Silmet	Nosov, et.al.
	Proposed Focus Areas	USETI Team
	Open Discussion	

UNITED · STATES
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Hazardous Waste Management and Minimization

Silmet Rare Earth Minerals Processing Facility

Sillamae, Estonia

Outlines of Executive Session and Workshop 1

Tuesday July 2, 1996 2

Wednesday July 3, 1996 3

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United States Environmental Training Institute

Hazardous Waste Management and Minimization

Silmet Rare Earth Minerals Processing Facility
Sillamae, Estonia

July 1-3, 1996

Executive Session Outline

and

Workshop Outline

[illegible] 20 Thomas Jefferson Street, N.W. • Suite 308 • Washington, D.C. 20007 • Tel 202 [illegible] • Fax [illegible]

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Hazardous Waste Management and Minimization
Silmet Rare Earth Minerals Processing Facility
Sillamae, Estonia

Monday Morning, July 1, 1996

10:00 a.m.	Presentation of Environmental Technical Library to the College of Sillamae and the Sillamae Facility	Mr. Vacys J. Saulys Mr. Donald McAllister
10:00 a.m.	Pre-Workshop Activities at RAS Silmet Facility	Ms. Ellen Dragotto

Hazardous Waste Management and Minimization
Silmet Rare Earth Minerals Processing Facility
Sillamae, Estonia

Executive Session
July 1, 1996

Monday Afternoon, July 1, 1996

1:00 p.m.	***Introductions and Opening Remarks***	Mr. Vacys J. Saulys
		Mr. Donald McAllister
	RAS Silmet Introductions	Mr. Priit Saksing
	Review of USETI Objectives during April Visit	Mr. Donald McAllister
	Summary of Key Observations from April	Mr. Donald McAllister
1:30 p.m.	***Overview of the Relation between Corporate Environmental Management and Privatization***	
	Marketability of RAS Silmet for Privatization	Mr. Jeff Cone
	Privatization Alternatives	Mr. Jeff Cone
	Viability as a Waste Depository	
	Viability of Power Plant Privatization	
	Factors Influencing Privatization	Mr. Jeff Cone
	Competitiveness	
	Environmental Factors	Mr. David Strayer
	Health and Safety Performance	Mr. Terry Douglas
	Utilization of External Support	Mr. Jeff Cone
	RAS Silmet Participation in *Turn-Around Management (TAM)* Project	
2:30 p.m.	Break	
2:45 p.m.	***Waste Management Concepts***	Mr. David Strayer
	Waste Management as a Process	
	Effective Planning for Waste Management	
	Integrated Pollution Prevention (P2) and Waste Minimization (WMIN)	
	Compliance Assurance and Reporting	
4:00 p.m.	***Wrap-up and Conclusion***	
	Specific Areas of Interest for RAS Silmet	Mr. Vladimir Nosov
	Proposed Focus Areas	Mr. Donald McAllister
	Open Discussion	

Hazardous Waste Management and Minimization
Silmet Rare Earth Minerals Processing Facility
Sillamae, Estonia

Workshop
July 1, 1996

Monday Evening, July 1, 1996

7:00 p.m.	Computerization/Data Management	Mr. Vacys J. Saulys
8:30 p.m.	Conclusion	

Hazardous Waste Management and Minimization
Silmet Rare Earth Minerals Processing Facility
Sillamae, Estonia

Workshop Outline
July 2 - 3, 1996

Tuesday, July 2, 1996

9:00 a.m.	***Waste Management Concepts***	Mr. David Strayer
	Waste Management as a Process Effective Planning for Waste Management Integrated Pollution Prevention (P2) and Waste Minimization (WMIN) Compliance Assurance and Reporting Organizing for Effective Waste Management Waste Characterization Waste Storage and Transportation Waste Treatment Technologies	
10:30 a.m.	Break	
10:45 a.m.	***Waste Management Concepts*** (continued)	Mr. David Strayer
	Review of RAS Silmet Waste Streams Discussion of Current Issues in Waste Management at RAS Case Study: Hazardous Waste Management Facility Scenario	
12:30 p.m.	Lunch	
1:45 p.m.	***Building a Waste Management Plan***	Mr. David Strayer
3:30 p.m.	Break	
3:45 p.m.	***Introduction to Pollution Prevention***	Mr. Terry Douglas
	What is Pollution Prevention (P2)? What is Waste Minimization (Wmin)? Why Consider P2 and Wmin? Developing a P2 and Wmin Program Cost/benefit Analysis RAS Silmet Opportunities	

Hazardous Waste Management and Minimization
Silmet Rare Earth Minerals Processing Facility
Sillamae, Estonia

Program Outline
July 2 - 3, 1996

Wednesday, July 3, 1996

9:00 a.m.	***Pollution Prevention Case Study***	Ms. Ann Randmer
10:15 a.m.	Break	
10:30 a.m.	***Occupational Safety and Health Management***	Mr. Terry Douglas
	Commitment to Protecting Worker Health Objectives in Managing OS&H Recognizing the Hazard Hazard Controls and Effective Work Planning Information Resources Benefits of An Effective Occupational Safety and Health Program RAS Silmet Issues and Proposed Solutions	
12:00 noon	Lunch	
1:30 p.m.	***Building an OS&H Management Plan***	Mr. Terry Douglas
3:30 p.m.	Break	
3:45 p.m.	***Program Conclusion***	Mr. Donald McAllister Mr. Vladimir Nosov
	Review of Workshop Objectives Implementation Assistance Draft Objectives for September Strategy for Follow Up	

Waste Management Concepts

Waste Management Concepts

- Waste Management as a Process
- Effective Planning for Waste Management
- Integrated Pollution Prevention and Waste Minimization
- Compliance Assurance and Reporting

Waste Management Concepts

- Organizing for Effective Waste Management
- Waste Characterization
- Waste Storage and Treatment
- Waste Treatment Technologies

Waste Management as a Process

Overview of Environmental Management Systems

Waste Management as a Process

- Integral Business Component
- Budgets
- Objectives
- Evaluation Standards (QA/QC)
- Continuous Improvement

Waste Management as a Process

- Elements of Environmental Management System
  - Policy
  - Planning
    - Environmental Aspects
    - Legal Requirements
    - Objectives

Waste Management as a Process

- Elements of an EMS (continued)
  - Implementation
    - Structure and Responsibility
    - Training, Awareness and Competence
    - Communication
    - Documentation
    - Document Control
    - Control Procedure (Routine)
    - Emergency Procedures

Waste Management as a Process

- Elements of an EMS (continued)
  - Checking and Corrective Action
    - Monitoring and Measurement
    - Nonconformance and Corrective Action
    - Records
    - Audit
  - Management Review

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Waste Management as a Process

- Benefits
  - Cost Savings
  - Regulatory Compliance
  - Better Market Positioning
  - Broader Customer Base
  - Response to Public Scrutiny Trends
  - Minimizes Accidents and Problems
  - Reduces Redundant Paperwork

Waste Management as a Process

- Benefits
  - Increased Competitive Advantage (Europe/Asia)
  - Increased Sales
  - Improved Customer Relations
  - Improved Public Impressions and Relations
  - Increased Regulator Confidence

Waste Management as a Process

- Benefits
  - Environmental Managers Performing More as Business Managers
  - Decreased Regulatory Oversight
  - Improved Liability Protection From Waste, Water, and Air Emissions
  - Streamlined Permitting Process
  - Increased Management Efficiency
  - Improved Management Effectiveness

Waste Management as a Process

- Benefits
  - More Accurate Planning/Accounting for Environmental Impacts
  - Opportunities for Lower Insurance Costs
  - Opportunities for Lower Financing Costs for Major Capital and Joint Venture Projects
  - Reduced Customer Audits
  - Opportunity to Decrease Potential Liability from Downstream Vendors
  - Reduced Input Costs
  - Reduced Management and Liability Costs

Effective Planning for Waste Management

Effective Planning for Waste Management

- Effective Planning Requires Clear Policy
  - Established by Top Management
  - Appropriate to Nature, Scale and Environmental Impacts of activities, products or services
  - Includes Commitment to Continual Improvement and Preventing Pollution
  - Includes Commitment to Compliance
  - Provides Framework for Setting Targets and Objectives
  - Is Documented, Implemented and Communicated

Effective Planning for Waste Management

- Environmental Aspects
  - Establish and maintain procedures to identify the environmental aspects of its activities, products, or services that it can control and over which it can be expected to have an influence, in order to determine those aspects which have or can have significant impacts on the environment.

Effective Planning for Waste Management

- Environmental Aspects
  - Ensure the aspects related to significant environmental impacts are considered in setting environmental objectives.
  - Update this information as appropriate

Effective Planning for Waste Management

- Legal and Other Requirements
  - Establish and maintain a procedure to identify and access the legal and other requirements to which an organization subscribes that are applicable to the environmental aspects of its activities, products or services

Effective Planning for Waste Management

- Objectives and Targets
  Establish and maintain documented environmental objectives and targets at each relevant function and level within the organization. Consider:
  - Legal and Other Requirements
  - Significant Environmental Aspects
  - Technological Options
  - Financial, Operational and Business Requirements
  - Views of Interested Parties

Effective Planning for Waste Management

- Objectives and Targets
  - Must be consistent with environmental policy, including commitment to continuous improvement and prevention of pollution

Integrated P2 and WMIN

Integrated P2 and WMIN

- Pollution Prevention (P2)

The use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source. P2 includes practices that reduce the use of hazardous and nonhazardous materials, energy, water, or other resources as well as those that protect natural resources through conservation or more efficient use.

Integrated P2 and WMIN

- Waste Minimization

The reduction of hazardous waste that is generated or subsequently treated, stored or disposed; including any source reduction or recycling activity that results in (i) the reduction of total volume or quantity of waste (2) the reduction of waste toxicity; or (3) both, as long as the reduction is consistent with the goal of minimizing present and future threats to human health and the environment.

Integrated P2 and WMIN

- Benefits
  - Reduced Operating Costs
  - Improved Employee Morale
  - Enhanced Company Image
  - Protection of Public Health and the Environment
  - Reduced Risk of Liability
  - Increased Competitiveness

Integrated P2 and WMIN

- P2 Methods
  - Source Reduction (Highest Priority)
  - Recycling
  - Treatment
  - Disposal

Integrated P2 and WMIN

- Not P2

(But may be good waste management practices where P2 is not feasible)

- Off-Site Recycling
- Waste Treatment
- Volume Reduction through Concentration
- Dilution
- Inter-Media Transfer

Compliance Assurance and Reporting

Compliance Assurance and Reporting

- Regular Monitoring and Measurement
  - Written Procedures
  - Calibrated Monitoring Equipment
- Record Results
  - Track Performance
  - Measure Conformance with Objectives and Targets
- Periodic Compliance Evaluation

Compliance Assurance and Reporting

- Investigate Nonconformance
  - Established Procedures and Responsibilities
  - Take Corrective or Preventive Action
    - Appropriate to Magnitude of Problem
    - Commensurate with Environmental Impact
  - Mitigate Negative Environmental Impacts
  - Document!

Compliance Assurance and Reporting

- Records
  - Written procedures
  - Identifiable, legible and traceable records
  - Readily retrievable and protected
  - Written record retention program
- Reporting
  - Internal
    - Management Review
  - External
    - Regulatory Agencies
    - Other Interested Parties

Organizing for Effective Waste Management

Organizing for Effective Waste Management

- Organization Issues
  - Environmental Manager
    - Roles and Responsibilities
    - Reporting (Chain of Authority)
    - Budget
  - Environmental Budget
    - Plant Director
    - Environmental Manager
    - Production Manager/Supervisors

Organizing for Effective Waste Management

- Organization Issues
  - Environmental Activities
    - Compliance (External and Internal)
    - Production Modifications

Organizing for Effective Waste Management

- Environmental Manager
  - Roles and Responsibilities
    - Advisor
    - Internal Consultant
    - Director
  - Reporting
    - Plant Director
    - Plant Engineer
    - Production Manager
    - Other
  - Budget

Organizing for Effective Waste Management

- Environmental Budget
  - Plant Director
  - Environmental Manager
  - Production Manager
  - Production Supervisors
  - Other
  - Combination

Organizing for Effective Waste Management

- Environmental Activities
  - Compliance
    - External
    - Internal
  - Production Review
    - New materials
    - New equipment
    - New processes

Waste Characterization

Waste Characterization

- Solid Waste
  - Discarded Material (Not Specifically Excluded)
    - Abandoned
    - Recycled
    - Inherently Waste-like

Waste Characterization

- Discarded Material
  - Abandoned
    - Disposed of
    - Burned or Incinerated
    - Accumulated, stored or treated prior to or in lieu of the above
  - Recycled
    - Used in a manner constituting disposal
    - Burned for energy recovery
    - Reclaimed
    - Accumulated speculatively

Waste Characterization

- Discarded Material (continued)
  - Inherently Waste-like materials
    - Defined by statute
  - Materials that are not SW when Recycled
    - Used or reused as ingredients
    - Substituted
    - Returned to original process
  - Materials that are SW even when Recycled
    - Used in a manner constituting disposal
    - Burned for energy recovery, used to produce or contained in fuels

Waste Characterization

- Discarded Material (continued)
  - Materials that are SW even when Recycled
    - Materials Accumulated Speculatively
    - Inherently Waste-Like Materials
- Not a Solid Waste
  - Domestic sewage
  - Scrap, paper, plastic or rubber not otherwise hazardous when recycled
  - Irrigation return flows
  - etc.

Waste Characterization

- Hazardous Waste
  - Listed
  - Characteristic
  - Derived-From Rule
  - Contained-In Policy

Waste Characterization

- Characteristic Hazardous Wastes
  - Ignitable
    - Flash Point (liquids)
    - Friction (solids)
  - Corrosive (liquids)
    - pH
    - "Steel Test"
  - Reactive
    - Evolves Cyanide or Sulfide
    - Violently Hygroscopic
    - Explosive

Waste Characterization

- Characteristic Hazardous Wastes
  - Toxic
    - Leachate Test
    - Meant to Simulate Landfill Conditions
    - Organics and Inorganics

Waste Characterization

- Listed Hazardous Waste
  - Non-Specific Sources
    - Grouped by Use
  - Specific Sources
    - Grouped by Industry
  - Discarded or off-specification commercial chemical products, container residues and spill residues
    - Toxic Waste (T, R, I and C)
    - Acutely Hazardous Waste (T and R)

Waste Characterization

- Mixture Rule
  - Characteristic Wastes
    - If Characteristic Remains
  - Listed Waste
    - While Listed Waste Remains Present
- Derived-From Rule
  - As above
- Contained-In Policy
  - As above

Waste Characterization

- Hazardous Waste Identification Rule
  - Statutory Exit Levels
  - Risk-Based Exit Levels
- Used Oil
- Universal Waste Standard
  - Pesticides
  - Batteries
  - Mercury-Containing Devices

Waste Storage and Transportation

Waste Storage and Transportation

- Generator Requirements
- Transporter Requirements
- Treatment, Storage or Disposal Facility Requirements

Waste Storage and Transportation

- Generator Status
  - Large Quantity Generator
    - Generates 1,000 Kg or more HW per Month
    - Most Highly Regulated Generator Category
  - Small Quantity Generator
    - 100 to 1,000 Kg/Month
    - Less than 6,000 Kg at Any Time
    - Intermediate Regulation
  - Conditionally Exempt (SQG)
    - Less than 100 Kg
    - Minimal Regulation

Waste Storage and Transportation

- Large Quantity Generator (LQG)
  - Waste Determination
  - Notification
  - 90-Day Maximum Accumulation Time
  - Certain TSDF Standards Apply:
    - Container Storage Requirements
    - Employee Training
    - Contingency Planning
    - Annual Reporting
    - Weekly Inspections
    - Waste Minimization

Waste Storage and Transportation

- Small Quantity Generator (SQG)
  - Waste Determination
  - Notification
  - 180-Day Accumulation
  - Container Storage Requirements
    - Less Stringent than LQG
  - Employee Training
  - Contingency Planning
  - Annual Reporting
  - Weekly Inspections
  - Waste Minimization

Waste Storage and Transportation

- Conditionally-Exempt SQG
  - Waste Determination
  - No More than 1,000 KG at Any Time

Waste Storage and Transportation

- Treatment, Storage and Disposal Facilities
  - Permits Required
  - Waste Determination
    - Generated Wastes
    - Received Wastes
  - Maximum Storage Time and Quantities Specified in Permit

Waste Storage and Transportation

- Treatment, Storage and Disposal Facilities
  - Container Storage Requirements
    - Approved (Shipping) Containers
    - Adequate Aisle Space
    - Special Requirements for Ignitable. Reactive and Incompatible Wastes
    - Communications and Alarms
    - Inspections and Corrective Measures
    - Records and Reporting

Waste Storage and Transportation

- Treatment, Storage and Disposal Facilities
  - Employee Training
    - Appropriate to Assignment
    - Annual Refreshers
    - Effects of Reassignment
  - Contingency Planning
    - Preparedness and Prevention
    - Notification and Reporting
    - Pre-planned Mitigative Measures
    - Coordination with Emergency Services

Waste Storage and Transportation

- Treatment, Storage and Disposal Facilities
  - Annual Reporting
  - Waste Minimization

Waste Storage and Transportation

- Transportation Requirements
  - Packaging and Labeling
  - Manifesting
    - "Cradle-to-Grave" Tracking System
  - Driver Training
  - Temporary Transfer Facilities
    - Up to 10-day storage
  - Transportation Incidents
    ADR Widely-Adopted in Europe
    (Accord European Surle Transport International des Marchandises Dangerous par Route)

Waste Treatment Technologies

Waste Treatment Technologies

- Treatment Methods
  - Physical
  - Biological
  - Chemical
  - Thermal
  - Extraction Technologies
  - Destruction Technologies
  - Immobilization Technologies

Waste Treatment Technologies

- Extraction Technologies
  - Physical Extraction
    - Abrasive Blasting
    - Scarification, Grinding and Planing
    - Spalling
    - Vibratory Finishing
    - High Pressure Steam and Water Sprays
  - Chemical Extraction
    - Water Washing and Spraying
    - Liquid Phase Solvent Extraction
    - Vapor Phase Solvent Extraction

Waste Treatment Technologies

- Extraction Technologies
  - Thermal Extraction
    - High Temperature Metals Recovery
    - Thermal Desorption

Waste Treatment Technologies

- Destruction Technologies
  - Biological Destruction (Biodegradation)
  - Chemical Destruction
    - Chemical Oxidation
    - Chemical Reduction
    - Thermal Destruction

Waste Treatment Technologies

- Immobilization Technologies
  - Macroencapsulation
  - Micorencapsulation
  - Sealing

Integrated Waste Management Planning

Integrated Waste Management Planning

- "Cradle to Grave"
- Raw Feedstock Inventory (i.e., Hazardous Material Inventory
- Process Flow Diagram(s)
  - Hazardous Materials In
  - By-products (air emissions, spent material, etc.)
- Example Process Flow Diagram (Spray Paint Operation)

Integrated Waste Management Planning

- Example Process Flow Diagram (Spray Paint Operation)
  - Solvent-based (Methyl Ethyl Ketone) Paint with Trace Heavy (i.e., RCRA Metals)
  - Spray Paint Gun Used for Application
  - Paint Booth Air Handling System and Filters
  - Closed-loop Paint Gun Cleaning (Solvent) Operation
  - Open-loop Paint Gun Cleaning (Solvent) Operation
  - Paint Becomes Old and Useless

Integrated Waste Management Planning

- Generator Status
  - Large Quantity Generator (LQG)
    - Equal to or Greater than 1,000 Kg (2,200 lbs) of Hazardous Waste per Month
  - Small Quantity Generator (SQG)
    - Between 100 Kg and 1,000 Kg per Month
    - Less than 6000 Kg at Any One Time
  - Conditionally-Exempt (SQG)
    - Less than 100 Kg

Integrated Waste Management Planning

- Large Quantity Generator (LQG)
  - Determination
  - Notification
  - 90-day Accumulation
  - Container Accumulation Requirements
  - Employee Training
  - Contingency Planning
  - Biennial/Annual Reporting
  - Waste Minimization
  - Weekly Inspection

Integrated Waste Management Planning

- Small Quantity Generator (SQG)
  - Determination
  - Notification
  - 180-day Accumulation (270-day for Shipments Greater than 200 Miles)
  - Container Accumulation Requirements (Less Stringent)
  - Employee Training
  - Contingency Planning
  - Biennial/Annual Reporting
  - Waste Minimization
  - Weekly Inspection

Integrated Waste Management Planning

- Conditional-Exempt Small Quantity Generator (SQG)
  - Determination
  - No More than 1,000 Kg at Any Time

Integrated Waste Management Planning

- Hazardous Waste Management Plan
  - Policy and Authority
  - Definitions
  - Regulations
  - Specific Responsibilities
  - Hazardous Waste Inventory
  - Generator Requirements
  - Hazardous Waste Accumulation and Storage
  - Transportation and Disposal Requirements
  - Training
  - Reporting and Recordkeeping

Integrated Waste Management Planning

- Hazardous Waste Management Plan (Continued)
  - Spill Contingency and Preparedness Plan
  - Waste Minimization
  - Closure and Post-closure

Environmental Safety Designs Inc (919) 851 1866 by Chris McKeaman

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Policy and Authority
    - Chain of Command
    - Company HW Policy Statement
    - Disciplinary Actions and Violations
  - Definitions
    - Company and Regulatory
  - Regulations
    - Why do we Need This HWMP?

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Specific Responsibilities
    - Individuals and Positions Discussed in Chain of Command Chart
    - All Persons not Otherwise Specified
  - Hazardous Waste Inventory
    - Raw Products
    - Solid Waste
    - Hazardous Waste

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Requirements for Hazardous Waste Generators
    - Republic of Estonia
    - County Council/Local Government
    - Company Goals and Policies
    - International Regulatory Structure
  - HW Accumulation and Storage Requirements
    - Siting/Design
    - Inspection
    - Emergency Equipment

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Transportation and Disposal Requirements
    - Labeling
    - Placarding
    - Manifesting
    - Technology Requirements
    - Land Ban or Alternate Treatment Goals
  - Training Requirements
    - Company Policy
    - US. Standards

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Reporting Requirements and Recordkeeping
    - HW Annual Report
    - Waste Minimization Report
    - HW Inventory
    - Training Records
    - Manifest

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Spill Contingency and Preparedness Planning
    - Equipment
    - Mutual Aid Agreements
    - Decontamination

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Spill Contingency and Preparedness Planning (Continued)
    - Equipment
    - Mutual Aid Agreements
    - Facility Design
    - Notification Procedures
    - Security
    - Evacuation Plans
    - Emergency Coordination Designation

Integrated Waste Management Planning

- Conclusion
  - Obtain Management Support
  - Define
  - Organize/Structure
  - Assign Responsibility
  - Develop Plan
  - Implement Plan

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Integrated Waste Management Planning

- Universal Waste Standard (Continued)
  - Large Quantity Handler (i.e., > 5,000 Kg at any one time)
    - Prohibitions (Disposing or Diluting)
    - Notifications (Name, Mailing Address, Responsible Person and Telephone Number, Address or Physical Location of Activities, List of all Types of UW Managed, and Statement that more than 5,000 Kg of UW is Managed at Location

Integrated Waste Management Planning

- Universal Waste Standard (Continued)
  - Large Quantity Handler (i.e., > 5,000 Kg at any one time) [Continued]
    - Waste Management
    - Labeling and Marking (Name and Date)
    - Accumulation Limits (One Year)
    - Employee Training
    - Release Response
    - Off-site Shipments

Integrated Waste Management Planning

- Universal Waste Standard (Continued)
  - Large Quantity Handler (i.e., > 5,000 Kg at any one time) [Continued]
    - Tracking Waste Shipments (Manifest)
  - Transporters
    - Prohibitions (Disposing and/or Diluting)
    - DOT Requirements
    - Storage (10 Days)
    - Release Response
    - Off-site Shipments

Integrated Waste Management Planning

- Universal Waste Standard (Continued)
  - Destination Facilities
    - Fully regulated TSD Facility
    - Off-site Shipments
    - Tracking (Same as LUWH)
  - Import Requirements
    - Allowed to Accept without Requiring a Permit
  - Petitions to Include Other Wastes

Integrated Waste Management Planning

- Hazardous Waste Management Plan (HWMP) Content Detail
  - Waste Minimization
  - Closure and Post-closure
    - Facility Decontamination Procedures
    - Sampling Procedures
    - Analytical Procedures
    - QA/QC
    - Action Levels
    - Monitoring
    - Certification of Removal

Integrated Waste Management Planning

- Used Oil Standard
  - Applicability
    - Used Oil and Listed HW
    - Used Oil and Characteristic HW
    - Ignitable HW and Used Oil Mixture Exclusion
  - Generators
  - Collection Centers and Aggregation Points
  - Transporter and Transfer Facilities
  - Processors and Refiners

Integrated Waste Management Planning

- Universal Waste Standard
  - Applicability
    - Batteries
    - Thermostats
    - Pesticides
    - Household and CESQG HW

Integrated Waste Management Planning

- Universal Waste Standard (Continued)
  - Small Quantity Handler (i.e., < or = 5,000 Kg at any one time)
    - Prohibitions (Disposing or Diluting)
    - Waste Management
    - Labeling and Marking (Name and Date)
    - Accumulation Limits (One Year)
    - Employee Training
    - Release Response
    - Off-site Shipments

INTRODUCTION TO POLLUTION PREVENTION

Length:	60 minutes
Purpose:	To familiarize attendees with the concepts of pollution prevention and waste minimization, and the benefits of incorporating these principles in operations design at RAS Silmet.
Objectives:	1. Understand the basic principle of pollution prevention. 2. Understand the basic principle of waste minimization. 3. Understand the elements of a pollution prevention and waste minimization program. 4. Understand the benefits of a pollution prevention and waste minimization program.
Special Terms:	Pollution Prevention Waste Minimization

Pollution should be prevented or reduced at the source whenever feasible.

Notes:

WHAT IS POLLUTION PREVENTION?

Pollution Prevention (P2) focuses on the reduction of waste generated at the source. It means:

* not producing wastes that could produce pollution;
* or lowering the toxicity of wastes that could produce pollution.

Pollution prevention does not include "end-of-pipe" treatments; that is, treatments performed on a waste stream after it has already been generated.

Examples of P2 include:

Process Re-engineering

Example:

(1) Replacement of a liquid solvent based cleaning operation with carbon dioxide pellet cleaning process;

(2) Use of scabbling for decontamination of radiologically contaminated surfaces instead of solvent based decontamination

Material Substitution

Example: Substitution of trichloroethylene with d-limonene in degreasing operations

Preventive Maintenance Programs

Example: Perform scheduled preventive maintenance on emission control equipment to assure continued operations

WHAT IS WASTE MINIMIZATION?

Waste minimization (WMin) is...

Source Reduction

Any activity that reduces or eliminates the generation of waste at the source, usually within a process.

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Notes:

Recycling

The recovery and/or reuse of what would otherwise be a waste material.

Examples of WMin include:

Source Reduction

Example: an industrial cooling water recycling system and a storm water retention basin for capture and reuse of storm water through the cooling water recycling system

Recycling

Example: On-site recovery of used solvents using atmospheric batch distillation or vacuum heat-pump distillation .

WHY CONSIDER P2 AND WMIN?

There are a variety of reasons for considering P2 and WMin in operations activities. These include the following:

- Attractive economics (including reducing waste treatment and disposal costs, and savings in raw material costs)
- Increasing environmental stewardship requirements for exporting (e.g., International Organization for Standardization (ISO) 14000)
- Avoidance of environmental problems and workplace safety hazards
- Improved public image and relationship with regulatory ministries

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DEVELOPING A P2 AND WMIN PROGRAM

Notes:

Planning and Organization

- Management Commitment
- Overall Assessment Program Goals
- Assessment Program Task Force
- Assessment Organization and Commitment to Proceed

Assessment Phase

- Collect Process and Facility Data
- Prioritize and Select Assessment Targets
- Select People for Assessment Teams
- Review Data and Inspect Site
- Generate Options
- Screen and Select Options for Further Evaluation

Feasibility Analysis Phase

- Technical Evaluation
- Economic Evaluation
- Select Options for Implementation

Final Report Including Recommended Options

Implementation

- Justify Projects and Objectives
- Installation (Equipment)
- Implementation (Procedures)
- Evaluate Performance Assessment Report of Selected Options

Successfully Implemented Waste Minimization Procedures

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ECONOMIC ANALYSIS

Notes:

Life Cycle Costing

A method for evaluating the costs and benefits associated with a project or a procedure over the entire time the equipment or procedure will be used.

Present Worth

A method for analyzing the future costs and benefits associated with a project or a procedure in terms of its current value.

Comparison Factors

Payback Period

An indicator of how long it will take to recover the funding spent to install a piece of equipment or implement a procedure with the cost savings realized by the new equipment or procedure.

Return on Investment

The monetary return resulting from the investment spent to install a piece of equipment or implement a procedure.

Benefits Cost Ratio

The ratio of all present value financial benefits of a P2 project to all present value costs. If the ratio is greater than 1, benefits out weight the cost and the project is a worthwhile undertaking.

Present Value of Net Benefits

The present value worth of a P2 project. It is the difference between all present value financial benefits and all present value costs.

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Introduction To Pollution Prevention and Waste Minimization

What Is Pollution Prevention (P2)?

- Eliminate the generation of wastes that may produce pollution
- Reduce the toxicity of wastes that may produce pollution

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The Pollution Prevention Hierarchy

- Prevention or reduction at the source
- Recycling and reuse
- Treatment
- Disposal

P2 Examples

- Process re-engineering
- Raw material substitution
- Preventive maintenance programs

What Is Waste Minimization (WMin)?

- Source reduction
- Recycling
- Reuse

Why Consider P2 and WMin?

- Financial advantages
- Environmental stewardship
- Avoidance of environmental problems
- Worker safety
- Improved public image
- Improved relationship with regulatory ministries

Developing a P2 and WMin Program

- Planning and Organization
- Assessment Phase
- Feasibility Analysis Phase
- Reporting
- Implementation

Economic Analysis

- Life Cycle Costing
- Present Worth
- Payback Period
- Return On Investment
- Benefits Cost Ratio
- Present Value of Net Benefits

OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT

Length: 90 minutes

Purpose: To familiarize attendees with fundamental elements of occupational safety and health management in an industrial setting.

Objectives:

1. Establish management's commitment to occupational safety and health (OSH) as the cornerstone to successful OSH management.
2. Define the goals of OSH management.
3. Discuss the relationship between OSH objectives and actions, and the OSH goals they support.
4. Provide an example of an OSH goal support by objectives and actions.
5. Discuss hazard recognition as it relates to OSH management.
6. Discuss the use of hazard controls and effective work planning to reduce risks.
7. Summarize the benefits of effective OSH management.
8. Provide a roster of OSH information resources available via the Internet.

"... assuring worker safety in a complex and sometimes dangerous modern economy is a vital function..."

Notes:

COMMITMENT TO PROTECTING WORKER HEALTH

Protection of workers' health must begin with senior management's commitment. It will only be assured if it is also supported by the actions of senior management.

* Communicate the company's occupational safety and health (OSH) protection policy to workers
* Establish an organization responsible for overseeing the OSH program
* Position the OSH organization within the upper tiers of management
* Define roles and responsibilities for safety and health protection
* Include safety performance as a criteria in business performance evaluation
* Resolve safety and health issues promptly

OBJECTIVES IN MANAGING OCCUPATIONAL SAFETY AND HEALTH

An effective OSH management program has clearly established goals. **Goals** may be broad in nature or specific to certain operations or injury and illness types. But the underlying goals of any effective OSH management program includes...

a) Reducing the risk of occupational injury or illness
b) Reducing the frequency of occupational injury and illness
c) Reducing the severity of injuries and illnesses
d) Know the limitations and strengths of the work force
e) Educating all workers in the hazardous aspects of their jobs and in the hazard controls used to reduce risk
f) Empower workers' to address hazardous conditions in the work place

Goals must be supported by clear objectives which will move the company in the direction of attaining their goals. **Objectives** must be clearly defined and measurable indicators of the company's performance. Objectives should be directed toward achieving specific goals.

Objectives will be met if the **actions** required to achieve it are defined and employees responsible for the actions understand their role.

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EXAMPLE

Notes:

Goal:

1. Reduce the risk of occupational injury or illness at RAS Silmet

Objectives:

1.1 Conduct a hazard survey of the RAS Silmet niobium production operations to identify occupational safety and health hazards to which employees are exposed.
1.2 Institute a facility surveillance program through which inspections of all work areas at RAS Silmet will be performed to identify safety and health hazards.

Actions:

1.1.1 Develop a checklist to be used during the hazard survey of RAS Silmet's niobium production operations.
1.1.2 Prepare a roster of all work areas associated with niobium production operations and include the names of work area supervisors.
1.1.3 Establish a method of capturing survey information so it may be used after surveys are complete for identifying and prioritizing occupational risk factors.
1.1.4 Schedule hazard surveys with work area supervisors.
1.1.5 Conduct hazard surveys.
1.1.6 Analyze hazard survey information.
1.1.7 Prepare a report of survey findings.

1.2.1 Develop a roster of RAS Silmet work areas and the work area supervisor.
1.2.2 Prepare a checklist to be used during periodic facility surveillances.
1.2.3 Prepare a schedule of periodic facility surveillances.
1.2.4 Conduct facility surveillances.
1.2.5 Document the findings of each facility surveillance and prepare a list of corrective actions to reduce the hazards observed.

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RECOGNIZING THE HAZARD

Notes:

Before we can reduce the risk due occupational safety and health hazards, we have know they exist. To know they exist, we have to be able to recognize a hazard when we see it. In some cases, we need specific training to recognize a hazard. But we can recognize many other hazards using the knowledge we have from doing a particular task or based on our familiarity with the work place .

Examples of hazards that require specific training to recognize include:

Radiological contamination
Nonionizing radiation (UV, Infrared, Microwave)
Electrical hazards

But we can recognize other hazards by listening to...

⇒ the lab worker who talks about the acid burns they get when conducting analyses; or

⇒ the production worker who talks about how difficult it is to breath and how their chest is in pain; or

⇒ the employee who talks about how often they trip and fall when working in a certain area.

HAZARD CONTROLS AND EFFECTIVE WORK PLANNING

Once hazards are recognized, controls must be put in place to reduce the risk of injury or illness to levels which are "as low as reasonably achievable" (ALARA). There are many different methods of hazard control. But generally, all controls will fall into one of three classes. These classes are:

Engineering controls
Examples include mechanical ventilation systems, electrical interlocks, and remote processing

Personal protective equipment controls
Examples include respiratory protection, gloves, hard hats, and steel-toed safety shoes.

Administrative controls
Examples include training and limiting length and frequency of exposures.

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Notes:

Usually, engineering controls are the most costly and most effective. Administrative controls are usually the least costly, but less effective than engineering controls.

Hazard controls must be selected based on:

* the severity of the injury or illness caused by the hazard;
* the likelihood of the injury or illness occurring ;
* the intensity and frequency of exposure to the hazard; and
* economic limits.

Effective work planning ensures that the requirements of the job have been considered, all equipment necessary to do the work is available, and the hazards the worker will be exposed to are being controlled. The worker performing the task should participate in the work planning since they have probably done the job before and know the hazards. A worker who is performing a task without the proper training, the necessary equipment and without the hazards under control is more likely to be injured.

BENEFITS OF AN EFFECTIVE OCCUPATIONAL SAFETY AND HEALTH PROGRAM

Management psychology tells us that the morale of a work force is related to their perception of how important the management team feels they are to the company.

Operational experience points out that the morale of the workforce is a significant factor in operational performance.

Workers are more likely to maintain a higher level of morale if they sense the management team cares about their health and well-being. The management team can demonstrate its care for the work force by ensuring the health and safety of the workers is protected.

By ensuring the health and safety of its workforce, the company also ensures that experienced workers remain on the job.

Higher morale will foster a greater sense of pride in the work each employee performs. This greater sense of pride will contribute to the productivity and the quality of the end-product manufactured by the company.

The increased productivity and higher quality will contribute to reduced operating costs, increased profitability, and economic potential for privatization.

INFORMATION RESOURCES

Notes:

There are many information resources available either in the form of printed materials or computer-based. Listed below are only a few of the Internet sites which contain an enormous amount of information pertaining to various aspects of occupational safety and health management.

Internet Sites

U.S. Army Industrial Hygiene Home Page
http://chppm-www.apgea.army.mil/Armyih/

U.S. Department of Defense
Lead: A quick Reference Guide
http://chppm-www.apgea.army.mil/Armyih/Docs/lead-guide.htm

National Institute for Occupational Safety and Health
http://www.cdc.gov/niosh/homepage.html

U.S. Environmental Protection Agency
http://www.epa.gov/

Occupational Safety and Health Administration
http://www.osha-slc.gov/

Agricultural Health and Safety Center, University of California at Davis
http://www-oem.ucdavis.edu/

Canadian Centre for Occupational Health & Safety (CCOHS)
http://www.ccohs.ca/

Department of Defense (DOD), Safety and Health
http://www.acq.osd.mil/ens/sh/

Duke Occupational & Environmental Medicine
http://152.3.65.120/oem/

Florida Agricultural Information Retrieval System (FAIRS)
http://hammock.ifas.ufl.edu/

Material Safety Data Sheets (MSDS - Trade Names) at Univ. of Utah Gopher
gopher://atlas.chem.utah.edu/11/MSDS

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Swedish National Institute of Occupational Health (NIOH)
http://www.niwl.se/

World Health Organization (WHO)
http://www.who.ch/

U.S. Department of Energy Radiation Control Manual
http://tis.eh.doe.gov/docs/rcm/rcm.html

Lab Safety Inc. Information Resources
http://www.labsafety.com/safeli~1.htm

Notes:

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Occupational Safety and Health Management

"... assuring
worker safety in a complex
and sometimes dangerous
modern economy is a
vital function..."

Commitment To Protecting Worker Health

- Commitment supported by actions
- Establish and communicate policies
- Consolidate oversight of safety and health
- Place high organizational priority on OSH
- Define roles and responsibilities
- Include OSH as a business performance measurement

Objectives In Managing Occupational Safety and Health

- Set Goals
- Establish objectives that are goal oriented
- Define required actions to achieve objectives

Fundamental OSH Management Goals

- Reduce risk of injury and illness
- Reduce frequency of injury and illness
- Reduce severity of injury and illness
- Know the makeup of the workforce
- Educate the workforce
- Empower the workforce

Recognizing The Hazard

- Knowledge of the process or operation
- Knowledge of the hazard through either training or work experience
- Measurement of the hazard

Hazard Controls

- Reduce the risk of injury or illness to "ALARA"
- Engineering controls
- Personal protective equipment controls
- Administrative controls

Hazard Control Selection

- Intensity of exposure
- Frequency of exposure
- Severity of injury or illness
- Probability of injury or illness
- Ease of use
- Cost

Effective Work Planning

- Considers requirements of the work to be performed
- Identifies hazards the worker will be exposed to
- Required training, tools and equipment are identified

Benefits of An Effective OSH Program

- Reduction in injuries and illnesses
- Fewer lost work days
- Improved morale
- Improved productivity and quality
- Improved economic potential for privatization

BUILDING AN OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PLAN

Length:	120 minutes
Purpose:	To familiarize attendees with the goals and content of an occupational safety and health management plan.
Objectives:	1. Define the objectives of the OSH Management Plan. 2. Identify key participants in the development of the OSH Management Plan. 3. Review the major elements of an OSH Management Plan.

Notes:

OBJECTIVES OF AN OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PLAN

An occupational safety and health (OSH) management plan should communicate:

* the company's occupational safety and health (OSH) protection policy to workers
* roles and responsibilities for implementation of and compliance with the OSH program
* goals of the company's OSH program
* procedures for addressing hazards existing in the work place

PARTICIPANTS IN THE DEVELOPMENT OF THE OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PLAN

For an effective OSH management plan to be prepared, every employee who will be covered by the plan must be considered. Nothing is accomplished if the plan only represents the viewpoint of the management team and sets forth requirements that are impossible to meet by workers. The plan is equally worthless if it only represents the viewpoint of workers and fails to satisfy the requirements of the management team.

Participants in the development of the plan should include:

- the company's management team
- the company's safety and health representatives
- the company's medical officer
- the company's training officer
- and representatives of workers from each of the company's operations.

ELEMENTS OF AN OSH MANAGEMENT PLAN

The OSH Management Plan is a **written document**. In order to be effective, **all workers** in the company must have access to the plan and they must understand that the guidance it provides applies to **every employee**. This includes the top levels of management and goes all the way down to the lowest paid worker in the company. The value of every employee's good health is important and the value does not change depending on their job.

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Notes:

Management Policy

This section communicates the policy set forth by the company's most senior management with respect to occupational safety and health. It must communicate the management team's commitment to preserving the good health and well-being of every employee. It must also make clear management's expectation that every employee will adhere to safety and health policies and procedures spelled out in the management plan. The management policy should convey the responsibility each employee has to report hazardous conditions when they are detected. It should also direct employees to stop work when their own safety and health, or the safety and health of others, is jeopardized by the activities being conducted.

OSH Goals

The OSH Goals section highlights the goals the company's management team has set for the OSH program. These goals compliment the company's mission and reflect the priorities of the management team. The OSH Goals set forth in the OSH Management Plan should be considered in every aspect of operations design and planning.

OSH Organization

Coordination and oversight of occupational safety and health is most effectively done when this function is consolidated within a single organization. Consolidation of the coordination and oversight function should never be interpreted as meaning that RESPONSIBILITY for maintaining a safe workplace is assigned to a single organization. The assurance of a safe workplace is a responsibility assigned to every worker in the company. Ultimate responsibility for a safe workplace must be assigned to the senior management of the company who are in the most influential position to direct a prompt response to hazardous situations.

The organization charged with coordination and oversight of occupational safety and health serves as a resource for guidance on improving hazardous conditions in the company's facilities and operations. It also conducts surveillance of facilities and operations to identify hazardous conditions or operations needing improvement. This organization is staffed by personnel who have received safety training. This organization will be more effective if the personnel have experience in the practice of occupational safety and health.

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Notes:

The importance of occupational safety and health is reflected by the level of management the manager of the organization charged with coordination and oversight of occupational safety and health reports to. A high level of importance is reflected when the occupational safety and health manager is a member of the senior management team and reports directly to the general director of the company. This suggests that safety and health considerations are important in determining the how the company will operate.

Roles and Responsibilities

In order for any program, including occupational safety and health programs, to be effectively implemented, it is critical that every person involved understand their roles and responsibilities. This section provides detailed guidance on the safety and health function of every worker in the company and the responsibilities they bear. Roles and responsibilities for safety and health are defined for :

* the general director,
* the senior staff,
* the occupational safety and health manager,
* the occupational safety and health organization,
* the procurement and medical organizations,
* the manufacturing organizations,
* manufacturing support organizations, and
* the workers of the company.

OSH Performance Indicators

In a previous section, the company's goals were defined. In order to support the goals, objectives must be established that move the company in the direction of achieving its goals. If the objectives are to be met, actions which must be taken to arrive at the objective must be defined. But in order to know how well the actions are moving the company towards its goals and objectives, performance indicators must be outlined.

Performance indicators are measurements that indicate how quickly progress is being made, whether a time dependent objective will be achieved on schedule based on the current rate of progress, and if changes need to be made in the method for pursuing the objective. Indicators can directly measure progress towards an objective or it can indirectly measure progress.

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Notes:

This section describes the performance indicators the company's management team will use to evaluate progress in achieving and maintaining a safe work place. Such indicators might include the rate of injuries or illness reported among the work force annually. Another indicator might be the number of lost work days each month due to occupational illnesses or injuries.

OSH Program Areas

This section describes the specific safety and health protection programs the company implements. These programs address specific occupational hazards such as ionizing radiation, hazardous materials, and high pressure systems or vacuums.

Each program will describe the:

* purpose of the program,
* policies which apply specifically to the program,
* definitions of unfamiliar terms used in the program document,
* applicability of the program,
* program specific responsibilities,
* program specific requirements, and
* procedures for implementing the program.

Safety and Health Training and Education

Employee training and education are highly effective administrative controls for minimizing the risk of occupational safety and health hazards. Through the educational process an employee is taught methods for minimizing risk and how to utilize the hazard controls that are provided. Training can cover topics including the use of personal protective equipment , the recognition of hazardous conditions, and the use of engineering controls like mechanical ventilation systems. Without proper training, the hazard controls provided to an employee are useless and in some cases will expose the employee to increased risk. And failure to adequately train an employee in hazard recognition may prevent an employee from knowing when they are being exposed to increased risk .

This section of the OSH management plan should address the training requirements that apply to the company's work force. There will be training that all workers will receive. Examples may include basic hazard recognition, procedures for reporting hazardous conditions, emergency exit procedures, and others. But there will also be specific training that is only required for

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Notes:

those performing certain tasks. For example, only users of respiratory protective equipment will require training in the use of this equipment and only welders may require training in the occupational hazards and controls for welding operations.

This section will also describe the skill level an employee must demonstrate after training before being allowed to perform the job. The best time to find out an employee can not correctly perform a task that may cause him or her harm is while the employee is still in the training setting.

Medical Surveillance

A key factor in effective in occupational safety and health management is assurance of worker fitness. The demands of a job must be compared to the physical condition of the employee in order to assure that risks of injury or illness can be minimized. For example, assigning an employee who is allergic to a chemical to a job that requires the use of the chemical is poor safety and health management. Or requiring an employee with reduced lung function due to lung disease to use respiratory protection may put the worker in jeopardy and aggravate his medical condition. Consequently, the job is done poorly and the worker may experience further injury.

Medical surveillance is performed when an employee is initially hired to determine if there are any existing medical conditions that may be aggravated by hazards that may be present in the work place. Periodic medical examinations are performed after the initial examination to determine if the worker is experiencing any adverse health due to exposures to hazards in the work place or if the worker has developed any medical conditions that may be aggravated in the work place. For example, a new employee is hired and is tested for hearing acuity because the employee will be working in a high noise work place such as a machine shop or foundry. Each year after the employee is hired, hearing acuity testing is done to determine if the worker has experienced any hearing loss. The testing will also indicate if the personal protective equipment he is using is effective at protecting his hearing. If the employee has lost hearing, it may be appropriate to provide him better hearing protection or to reassign him to work in a work place with lower noise levels. Medical surveillance should also be performed after known or suspected exposures to hazardous substances or if symptoms of exposure develop.

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Notes:

Inspection and Surveillance

In order to control the hazards in a work place and minimize the risk they present to workers, they must be accurately anticipated or promptly detected. The work place is not a static setting. It changes with the type of work being performed and the employees performing the work.

An effective OSH management plan will include an inspection and surveillance program focusing on early detection of hazardous conditions. Inspections should be performed in every work area of the company's facilities on a periodic basis. The frequency is dependent on:

* the types of hazards that exist or are anticipated,
* the likelihood of workers being exposed to the hazard,
* the risk of injury or illness,
* the severity of the injuries or illnesses, and
* controls in place to prevent the hazard and reduce the risk.

The inspection and surveillance section should also address the investigation of any injury or illness that results in lost work days of an employee or a limitation in their physical ability while at work. Injuries and illness are an unmistakable sign of an occupational hazard which is not being effectively controlled.

Recordkeeping

The written records of the occupational safety and health program will serve as valuable pieces of information. This information will be very useful:

* in tailoring the OSH program to meet the needs of the company,
* during investigations of illnesses and injuries,
* in measuring the company's progress towards achieving occupational safety and health objectives, and
* in performing trend analysis of injuries and illness to identify program areas in need of improvement.

This section should provide guidance on the types of records that will be kept, the method for retaining the records, and the roster of personnel with authority to gain access the records since they may be personal in nature.

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EXAMPLES OF OSH PROGRAM AREAS

Safety Permit
Hazardous Materials
Electrical Systems Safety
Lockout/Tagout
Non-Ionizing Radiation
Shop Safety and Machine Guarding
Confined Space Entry
Explosives & Pyrotechnics
Cranes & Lifting Devices
Pressure Safety
Emergency Evacuation Plan
Detection Systems
Walking/Working Surfaces
Occupational noise exposure
Sanitation
Hazard communication
Asbestos
Bloodborne pathogens
Training Requirements
Process Systems Safety
Welding, Cutting, and Brazing
Ionizing Radiation
Laboratory Safety
Personal Protective Equipment
Construction Safety
Vehicle & Pedestrian Safety
Buddy System
Facility Safety & Health Inspection
Engineering Controls
Medical Surveillance
Carcinogen Control
Flammable and combustible liquids
Fire Protection
Air contaminants
Lead
Mishap Reporting/Accident Investigation
Hazardous waste operations and emergency response.

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Building An Occupational Safety and Health Management Plan

Objectives of An OSH Management Plan

- To communicate
- Company's OSH policy
- Roles and responsibilities
- OSH Goals
- Procedures

Participants In Plan Development

- Management team
- Safety and health representatives
- Medical director
- Training director
- Operations representatives

An OSH Management Plan Must Be...

- Written
- Available to all workers
- Applicable to every worker

OSH Management Plan Elements: Management Policy

- OSH policy for the company
- Commitment to preservation of safety and health
- Clear expectation of adherence
- Individual responsibility
- Empowerment

OSH Management Plan Elements: <u>OSH Goals</u>

- Compliment company's mission
- Reflect priorities of management team
- Consider in operations design and planning

OSH Management Plan Elements: <u>OSH Organization</u>

- Centralized coordination and oversight
- Implementation and hazard detection
- Safety is every worker's responsibility
- Placement of OSH coordination and oversight function reflects the priority

OSH Management Plan Elements:
Roles and Responsibilities

- Define roles and responsibilities
- Understand roles and responsibilities
- Accept roles and responsibilities
- Include all participants in OSH

OSH Management Plan Elements:
OSH Performance Indicators

- Measurement of progress
- Direct indicators
- Indirect indicators
- Adjustment to action plan

OSH Management Plan Elements: <u>OSH Program Areas</u>

- Hazard-specific programs
- Guidance on program applicability
- Guidance on program-specific responsibilities
- Guidance on requirements and implementation

OSH Management Plan Elements: Training and Education

- Highly effective administrative control
- Define training requirements (general and specific)
- Demonstrated proficiency
- Training frequency

OSH Management Plan Elements: Medical Surveillance

- Worker fitness
- Should be based on physical demands of the work
- Initial medical exam
- Periodic medical exam
- Assess effectiveness of hazard controls

OSH Management Plan Elements:
Inspection and Surveillance

- Early hazard detection
- Changing work place conditions
- Changing workforce
- Coverage of facility
- Frequency and schedule
- Injury and illness investigations

OSH Management Plan Elements: Recordkeeping

- Written documentation
- Valuable information resource
- Tailoring of company's OSH needs
- Trend analysis
- Types of records to be kept
- Retention time

EXECUTIVE SESSION
ON
ENVIRONMENTAL MANAGEMENT

TALLINN, ESTONIA
JULY 2, 1996

I.	**INTRODUCTION**	Mr. Jay McAllister
		Mr. Vacys Saulys
	Personal Qualifications	US Team
	The Boundary Assessment	Mr. Jay McAllister
II.	**OPENING REMARKS**	Mr. Jay McAllister
	April Visit to RAS Silmet	
	Present Visit to Estonia	
III.	**SUMMARY OF APRIL REPORT**	Mr. David Strayer
	Issues and Key Areas of Interest	
IV.	**ENVIRONMENTAL MANAGEMENT CONCEPTS**	Mr. David Strayer
	Reasons for Environmental Management	
	What is an Environmental Management Plan	
	How to Build an Environmental Management Plan	
V.	**POLLUTION PREVENTION/WASTE MINIMIZATION**	Mr. Terry Douglas
	What is Pollution Prevention (P2) and Waste Minimisation (WMIN)	
	Reasons for Pollution Prevention and Waste Minimization	
	Developing a Pollution Prevention/Waste Minimization Plan	
VI.	**OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT**	Mr. Terry Douglas
	Why Consider an Occupational Safety and Health (OS&H) Plan	
	How to Build an Occupational Safety and Health Plan	
VII.	**TECHNICAL SUMMARY**	Mr. Terry Douglas
VIII.	**PROGRAM SUMMARY**	US Team
	Questions & Answers	

PARTICIPANTS OF THE EXECUTIVE SESSION ON ENVIRONMENTAL MANAGEMENT
ESTONIAN MINISTRY OF THE ENVIRONMENT
TALLINN, ESTONIA
JULY 2, 1996

Viktor Grigorjev	Ministry of the Environment	Department of Technology	372 62 62 860	372 62 62 801
Jaan Saar	Ministry of the Environment	Air and radiation service	372 62 62 865	372 62 62 801
Arvo Naelapea	Ministry of the Environment	Consultant	372 24 90 790	
Avo Korb	RAS Silmet	Vice Director General	372 39 76 567	372 39 77 447

Estonian Radioactive Waste Management Agency
AS ALARA Ltd.
Henno Putnik
Manager, Technical Operations

Kinku 6
EE0100, Tallinn
Estonia
henno@mhiks.envir.ee

phone +372 2 443941
fax +372 6313160
mobile ph. +372 51 245 126

PMU of EHWMS
Project Management Unit of Estonian
Hazardous Waste Management System

PEETER RÜNGAS
Director

Mustamäe tee 33
EE0006 Tallinn
ESTONIA

Phone +372 6 565 413
Fax +372 6 565 413
NMT +372 5 242 046

SILMET

VLADIMIR NOSOV
Keskkonnakaitse osakonna juhataja
Head of environment protection department

RAS Silmet
Kesk tn.2
EE2010 Sillamäe
EESTI

Tel: +372-39-74 389
sekr.: +372-39-24 048
Fax: +372-39-77 447

EnSafe Environmental and Safety Designs, Inc.

David C. Strayer
Senior Project Manager

400 TechneCenter Drive • Suite 301
MILFORD OHIO 45150
(513) 248-8449 • FAX (513) 248-8447

TALLINN TECHNICAL UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL ENGINEERING

AIN LÄÄNE
PROFESSOR. Ph.D.
HEAD OF THE CHAIR OF ENVIRONMENTAL PROTECTION

Jarvevana tee 5
EE0001 Tallinn
ESTONIA

Phone +372 2 431 244
Fax +372 655 6211

(914) 478-7664

THE HUBB GROUP

JEFFREY N. CONE
PRESIDENT

51 VILLARD AVENUE
HASTINGS-ON-HUDSON, NY 10706

Estonian Ministry of the Environment -
U.S. Environmental Protection Agency

KAI HELM
Cooperative Programme Coordinator

24 Toompuiestee
EE0100 Tallinn
Estonia

tel./fax Int+372-2-425-314
e-mail: kai@life.envir.ee

ERASTAMISAGE TUUR

Kullo Remme
LABIRAAKIMISTE OSAKOND

RAVALA 6
EE0105 TALLINN

TEL.+372 6 305 618
TEL.+372 6 305 601

FAX +372 6 305 698
FAX +372 6 305 699

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

(312) 353-7648
FAX (312) 353-1120
e-mail: Saulys.Vacys@EPAMAIL.EPA.GOV

VACYS J. ŠAULYS
Deputy Director

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region V, Office of International Activities
77 West Jackson Boulevard R-19J
Chicago, Illinois 60604-3590

UNITED • STATES ENVIRONMENTAL • TRAINING INSTITUTE

Donald H. McAllister, Jr. (Jay)
Director, Business Development

1000 Thomas Jefferson St., NW
Suite 308
Washington, D.C. 20007

Tel. 202/338-3400
Fax 202/333-4782

UNITED • STATES • ENVIRONMENTAL • TRAINING INSTITUTE

Ellen M. Dragotto
Curriculum Development Manager

1000 Thomas Jefferson St., NW
Suite 308
Washington, D.C. 20007

Tel. 202/338-3400
Fax 202/333-4782

On & Ko

Toomas Ideon
Managing Director

Phone: +(372) 2 494618
Fax: +(372) 2 494618

MINISTRY OF THE ENVIRONMEN

MATTI VIISIMAA
Ph. D. (Chem.Eng.)
Head of the
Waste Management Office

24 Toompulestee
EE0100 Tallinn Estonia

Telephone Int+372 6262 86
Telefax Int+372 6262 80

EET
TN CORPORATION

Terence A. Douglas, CIH

P. O. Box 30964
Knoxville, TN 37930

PHONE (423) 671-780(
FAX (423) 671-777

Environmental, Health, and Safety Services and Technology

MINISTRY OF FOREIGN AFFAIRS
REPUBLIC OF ESTONIA

MAIU FISCHER
Department of Foreign Economic Policy
Desk Officer

Ravala pst. 9
EE0100 Tallinn
Estonia

Phone (372) 6 317 2(
Fax (372) 6 317 0(
E-mail MFISCHER@vm1.vm

Sillamäe Linnavalitsus

VADIM KIRITSENKO
peaökoloog

Kesk 27
EE 2010 Sillamäe
Eesti Vabariik

tel +37 +239-77824
fax/tel : +239-74198

EESTI ERASTAMISAGENTUUR

Andres Uusma

ERASTAMISUKSUSE PEASPETSIALIST

RAVALA 6
EE0105 TALLINN

TEL +372 6 305 648
TEL +372 6 305 628

FAX +372 6 305 699
FAX +372 6 305 657

ESTONIAN INVESTMENT AGENCY

MADIS MARII
PÕHJA-EESTI ESINDAJA
NORTH-ESTONIA REPRESENTATIVE

RAVALA 6-602 B
EE-0105 TALLINN
ESTONIA
TEL (372) 641 01 66
FAX 372 641 05 12

ESTONIAN MANAGEMENT INSTITUTE

ANNE RANDMER, Ph. D.
Director
Centre for Balanced Development Programs

21 Sütiste Street
EE0034 Tallinn
Estonia

Phone 372-2-52 16 29
Fax 372-6-39 21 12

Ministry of Defence
Republic of Estonia

Jürl Valge
Acting Deputy Chancellor

Sakala 1
EE0100 Tallinn,
ESTONIA
Phone +372 640 6014
GSM. +372 50 16838
Fax. +372 640 6002

MINISTRY OF THE ENVIRONMENT

HARRY LIIV
Head of Water Department

24 Toompuiestee
EE0100 Tallinn Estonia

Telephone Int +372 6262 850
Telefax Int +372 6262 801

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An Executive Session on Environmental Management

At Estonian Ministry of the Environment
Toompuiestee 24 Tallinn
July 2, 1996
14.15-17.30

Minutes of meeting

On the ES participated all together 25 persons from various institutions. The attachments contain:
lists of participants and
list of the agenda.

Introduction was done by Mr. Harry Liiv after which Mr. Jay McAllister introduced the US team and gave an overview of the United States Environmental Training Institute activities.

Mr. Vacys Šaulys gave a short overview of the Cooperative Agreement between the Estonian Ministry of the Environment and US Environmental Protection Agency. This project is one of the projects in the frames of the agreement. The main goal for this project was to assess the pertinent interactive environmental, and operational aspects of the RAS Silmet.

As this US team visit was the second one in Estonia in frames of this project, Mr. McAllister gave an overview of the findings of the April 1996 visit. He underlined that the situation has significantly changed during these two months - mainly due to the steps taken in the privatization process of Silmet. After a short visit in April and based on overall information received US team is able to provide the main guidelines for Silmet in creating the environmental management plan. The workshop concerning these issues including waste minimization and pollution prevention and safety and health management was given to Silmet's staff the day before. The main idea was that although the privatization process in on its way, every potential investor is interested in the environmental management plans and safety and health management plans of Silmet as one of important parts of the overall management plan, which influences future negotiations.

Mr. David Strayer made a presentation of the technical findings of the April visit.

After the presentation, Mr. Šaulys asked the representatives from Silmet, who participated at the session, their comments on the presentation. Mr. Avo Korb referred that a lot of investigations have been made before and he would expect to start new projects from the point that the results of previous investigations are known beforehand. He did not comment the results and benefits of the seminar held the day before to the Silmet's staff due to the short time difference between these two activities. Mr. Liiv wanted to know from the US team, in addition to the overall environmental management plan, what may be the more specific proposal to Silmet's side in spite of the privatization process. Mr. McAllister answered that in case there is a special request from Silmet side for dealing with some specific issue, US ETI experts are ready to assist. But, at the current situation after only three days of overall visit in April in Silmet they cannot provide some short and effective suggestions nor is the current privatization atmosphere conducive to operational changes. Mr. Stayer stressed that from the point of safety and health of the workers gives of course a short and effective result, if the facilities inside are improved with better lighting and visibility is increased. Mr. Jeff Cone gave an example from the point of as a potential investor, what is the main interests of the potential investors. Of course Silmet, due to the historical

background is not the typical facility, and as the plant is very tightly connected with Sillamäe town, finding of solutions it is much more complicated. For example, there is the question of the power plant. Mr. Arvo Naelepea asked a lot of questions which were answered by the US team and other participants of the session. The discussion focused on the wasteponds and on the potential damage to the environmental now and in future. Once again it was mentioned that in this kind of situation pollution prevention and waste minimization become especially important. The key word in these actions is liability and cost benefit. In some conditions, it may occur that fines are smaller than investigations and construction of new waste disposal sites.

Mr. David Stayer gave a short presentation on environmental management concepts and Mr. Terry Douglas gave a short presentation on pollution prevention/waste minimization and occupational safety and health management. Mr. Vacys Saulys summarized that while investors may expect to find old equipment and environmental problems they would expect the Estonians to recognize these problems and demonstrate willingness to address them.

In closing remarks, Mr. Šaulys highlighted once again that due to the short period of the project (US AID funded project is to be closed on September 30, 1996), not perfect timing (current privatization process of Silmet) and some miss communications from both sides the final outcome from this project was less than expected. But this does not cancel the possibilities of exchanging information between interested parties in future. In closing remarks, Mr. Liiv, in the name of the Ministry of the Environment, expressed his gratitude to the US team for providing assistance to Silmet and Ministry and expressed his hope that the US side will provide a final report for Estonian side.

Next day, at the meeting between Mr. Liiv and Mr. Šaulys was agreed, that US side will provide the draft version of the trip report before leaving and Estonian side (Ministry and Silmet) give their comments by July 22, 1996. The US side will repond to this and will submit the final report by August 19, 1996.

Silmet Privatization Notes

I. Estonian Objectives:

A. Adoption of EU Integration Plan:

- Goal - membership by 2001
- requires harmonization of Estonian laws and regulations
- ISO 14000
- existing environmental laws will change

B. Privatization Objectives:

- avoid the need for state subsidies
- attract foreign investments
- generate revenues from privatization

C. Silmet Specific Privatization Issues:

- State retains 35% ownership
- existing waste deposit facility
- lacking site for future waste
- power plant privatization

II. Western Firms Apply Global Standards to International Operations

"Silmet in the World News" (see attached article dated 2/21/93)

A. Public Image / Perception

- Union Carbide / Bhopal Disaster
- General Electric / Hungary
  - voluntary remediation of historical industrial site
- Levi Strauss
  - voluntary guidelines programs for sub-contractors
  - waste water / effluent
- Phillips Electronics NV
- Shell Oil

B. Financial Implications:

- Financial Institutions
  - identify environmental liabilities of all borrowers
- Capital Market Sources: Debt and Equity Issues
  - disclosure requirements for both public and private corporation

C. Uncertainty Factors:

- Environmental Liability
  - historical pollution
  - on-going pollution
- alternative sites unclear if existing ponds closed
- power station inclusion
  - management distraction
  - capital drain
  - potential financial risk / conflict of interest

III. International Technical and Funding Resources

A. Technical Assistance

- EBRD Turnaround Management (TAM) Program

B. Funding Resources

- EBRD loan for reconstruction of municpal water and waste systems (DM 20 million / 20 years)
- Regional waste site / project funding

C. Asian Development Bank - $20 million <u>grant</u> for biodiversity program