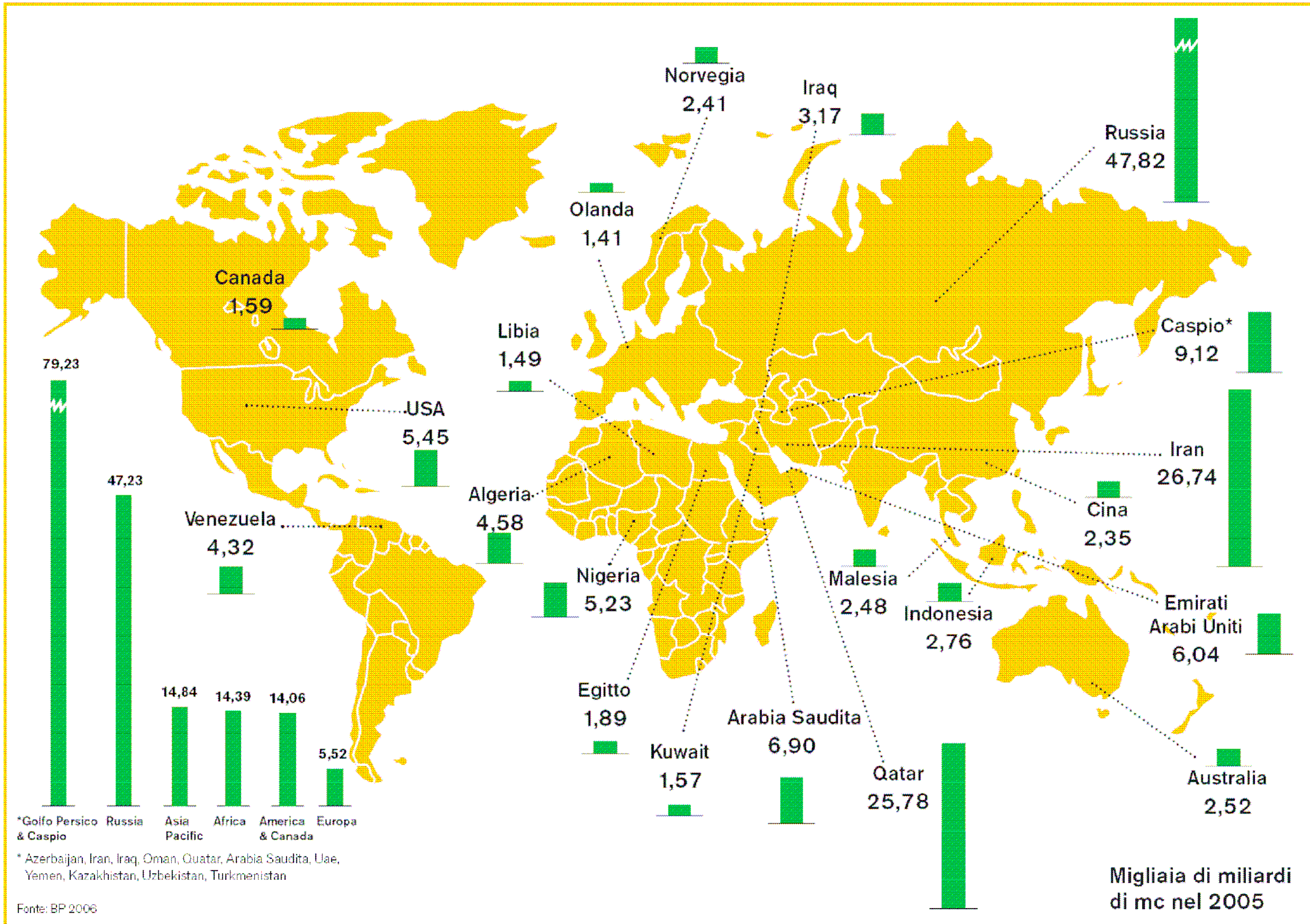
Il gas naturale
dove e quanto

LE RISERVE DI GAS NEL MONDO

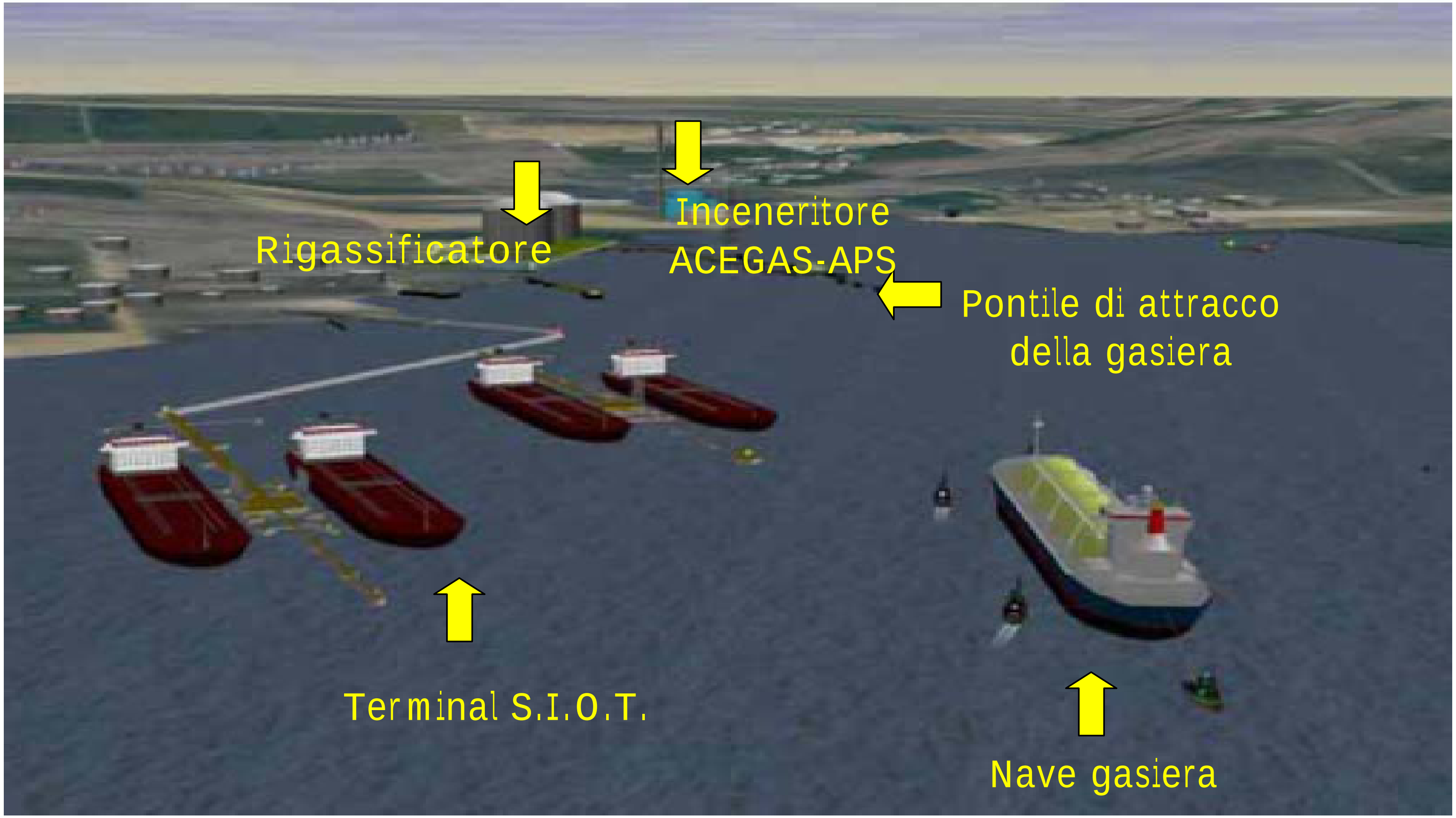


* Azerbaijan, Iran, Iraq, Oman, Quatar, Arabia Saudita, Uae, Yemen, Kazakhistan, Uzbekistan, Turkmenistan

Fonte: BP 2006

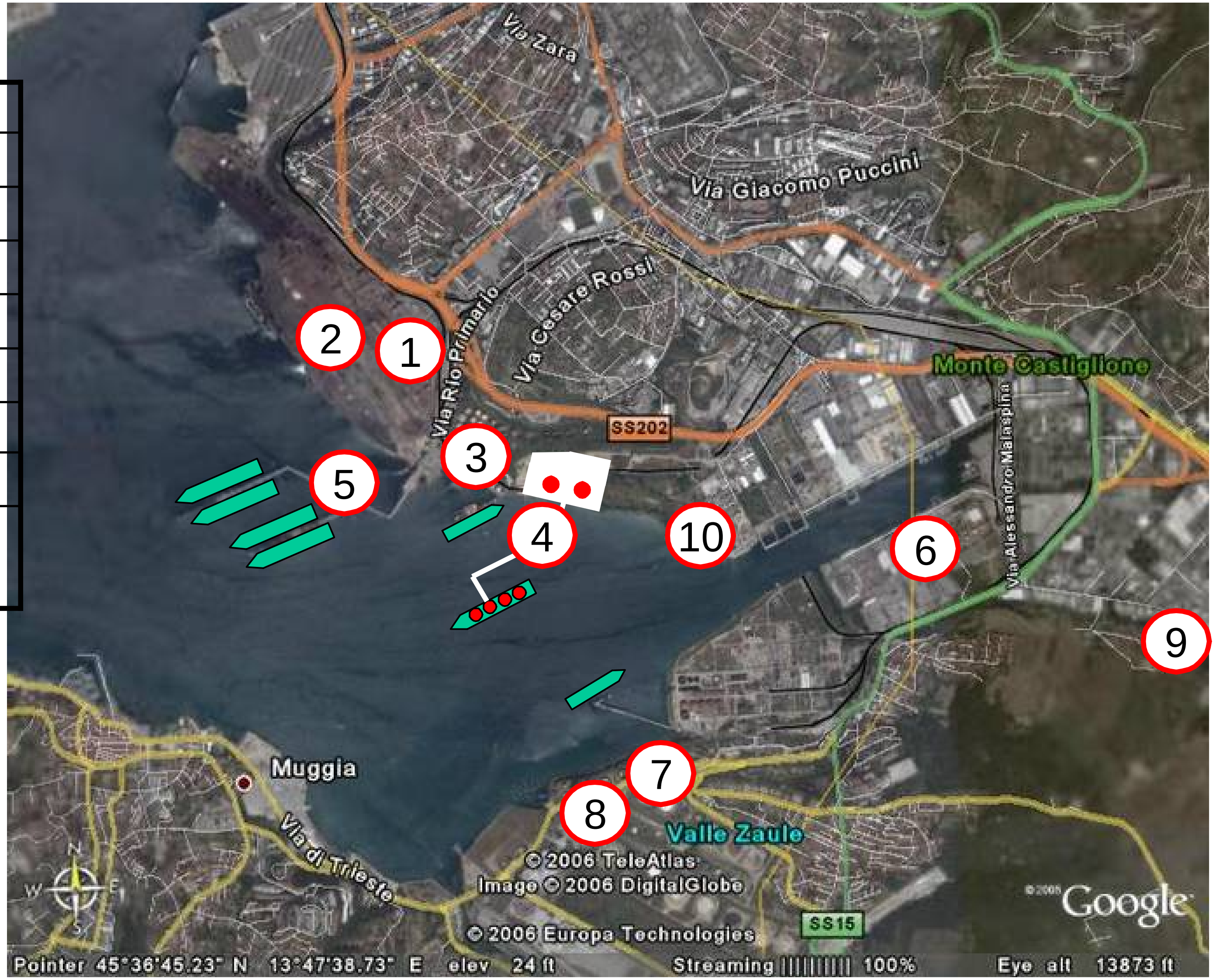
Migliaia di miliardi di mc nel 2005

Il terminale di rigassificazione di Trieste


Inceneritore
ACEGAS-APS
Rigassificatore
Pontile di attracco
della gasiera
Terminal S.I.O.T.
Nave gasiera

Industrie a rischio di incidente rilevante (Seveso 2) possibile effetto Domino

1	*Linde Gas*
2	*Ferriera Servola*
3	*Depositi Cost. TS*
4	*Imp. Gas Natural*
5	*Terminale SIOT*
6	*Alder (formaldeide)*
7	*Dep.Muggia benzinodotto*
8	*GTS – GPL*
9	*Depositi SIOT*
10	*Inceneritore Acegas*



Petroliere

Navi gasiere

COMITATO PER LA SALVAGUARDIA DEL GOLFO DI TRIESTE

Terminali

onshore si ma dove?

Terminali di importazione terrestri (Onshore)

Rappresentano la tecnologia più provata. Costituiti da bacino di attracco per le nav
due o più serbatoi di stoccaggio fuori terra o interrati (50-100000m3), rigassificato
ad acqua di mare. Collegamento con la rete distribuzione.

Esistono altre alternative?

Terminali Offshore galleggianti con o senza stoccaggio

Stesse operazioni dei sistemi a struttura fissa:

- Attracco
- Scarico
- Stoccaggio
- Rigassificazione

Navi perennemente ormeggiate con sistemi a torretta, equipaggiate con rigassificatori.

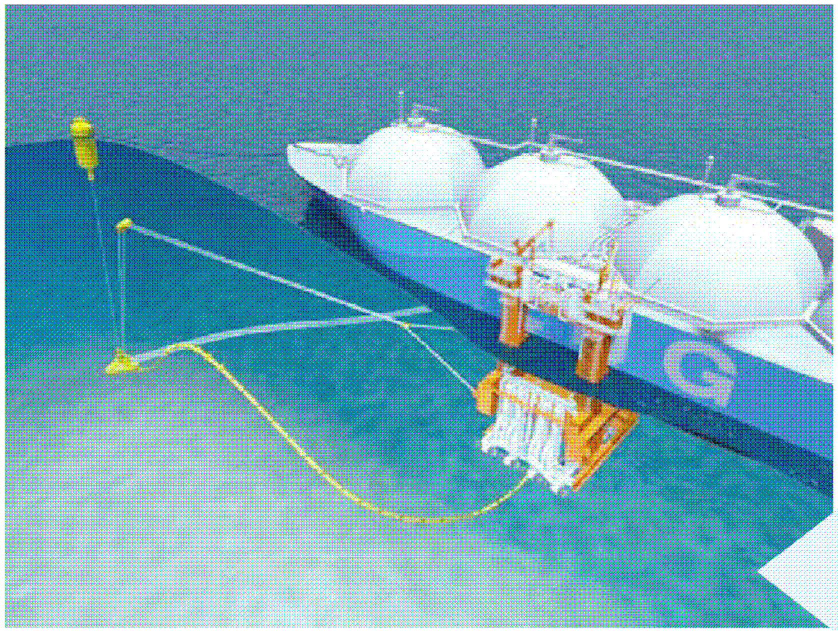
Nel caso che tutte le operazioni siano presenti sull'unità flottante si parla di unità flottanti di stoccaggio e rigassificazione (Floating Storage Regasification Unit).

Nel caso non si operi accumulo si parla di sistemi FRU (Floating Regasification Unit).

Altre configurazioni offshore mobili e/o galleggianti

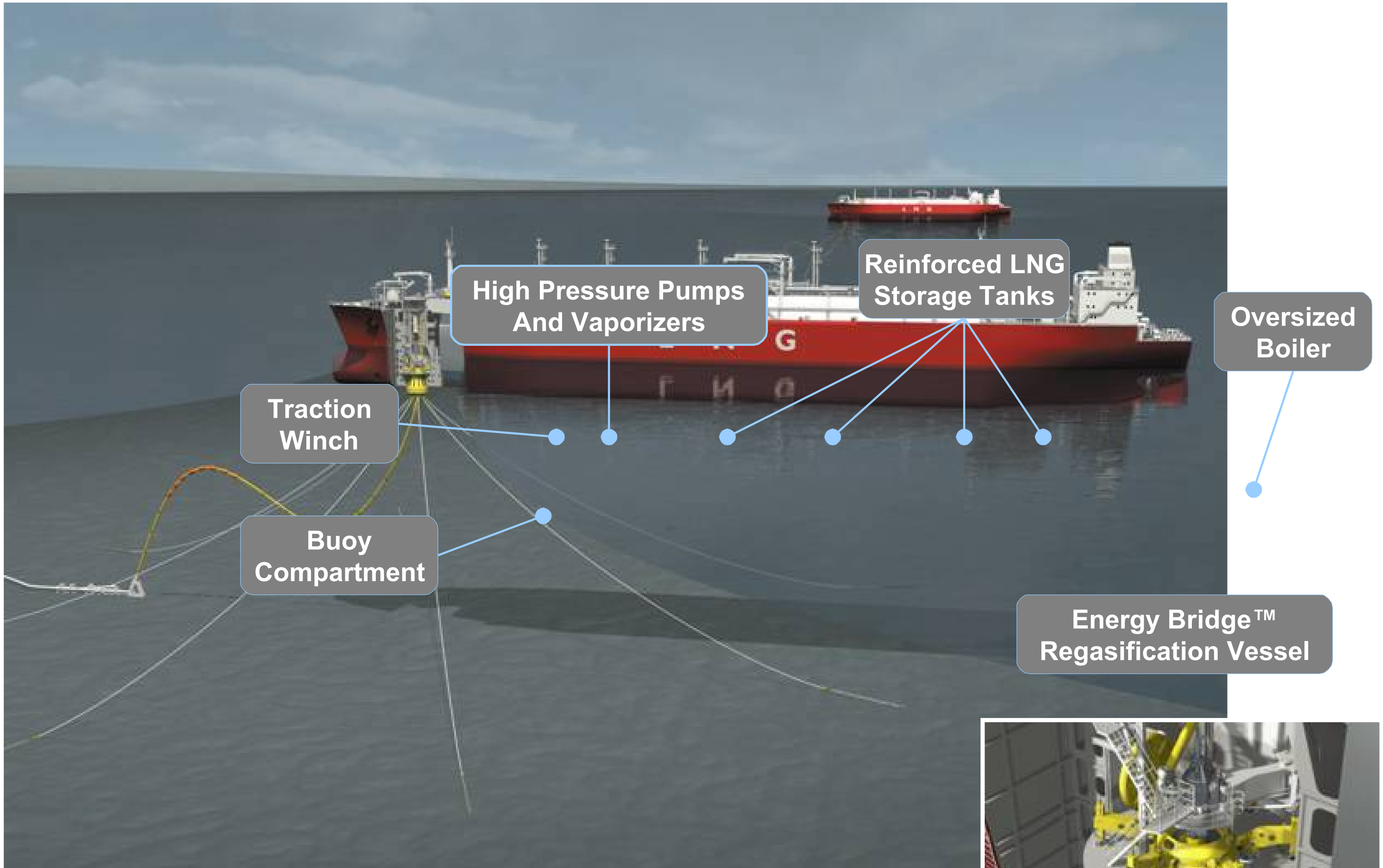
Navi ibride **EXCELERATE Co.**

combinano le funzionalità di nave gasiera con quelle di terminale di importazione galleggiante.

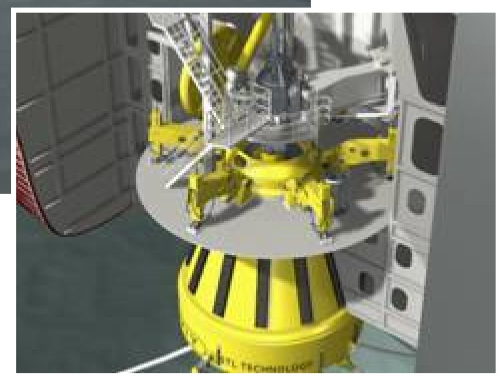


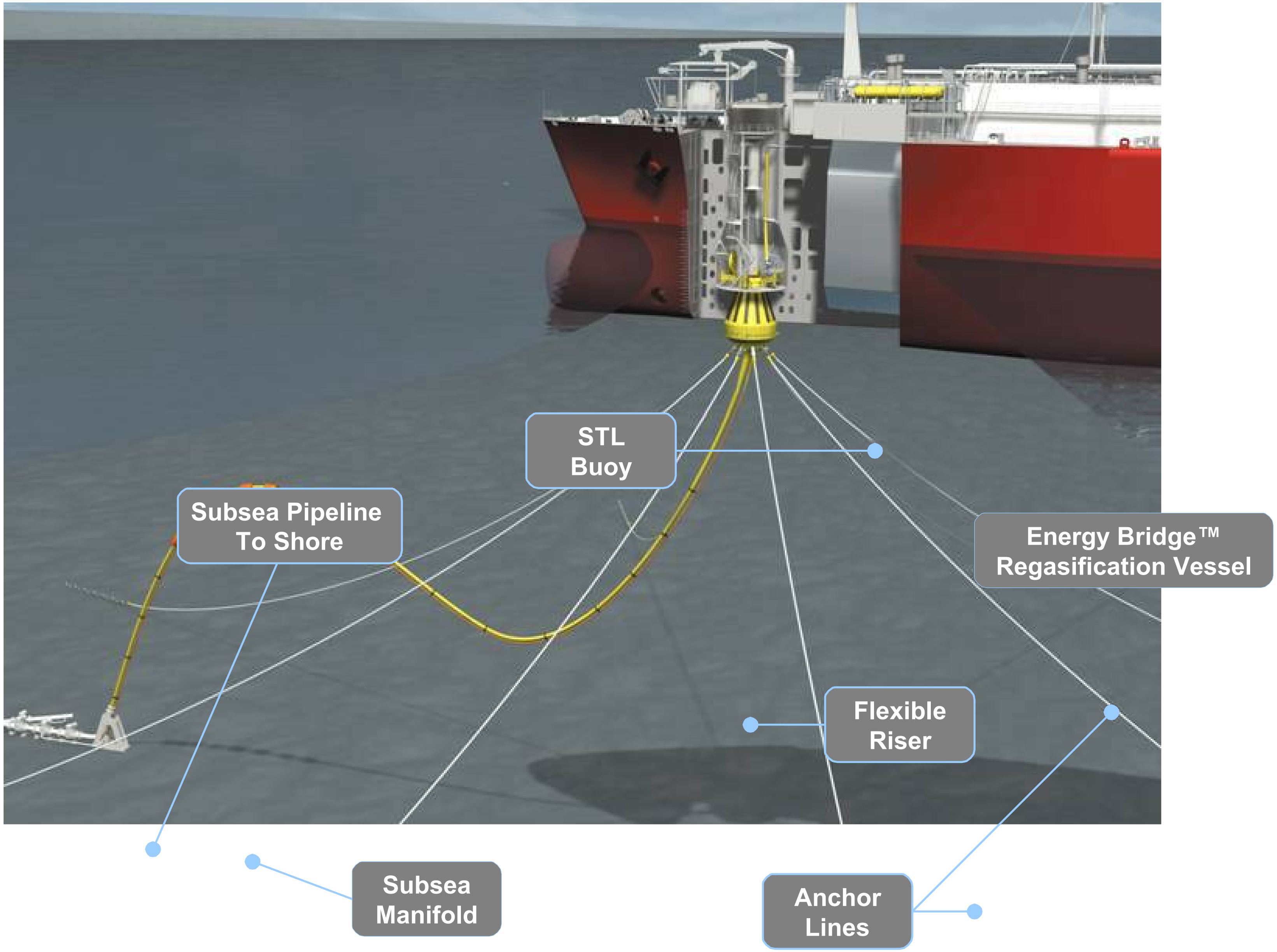
Sistemi senza accumulo intermedio

Dotati di pontoni galleggianti equipaggiati con unità di rigasificazione e collegamento diretto con pipeline sottomarina di immissione nella rete di distribuzione.



High Pressure Pumps And Vaporizers
Reinforced LNG Storage Tanks
Oversized Boiler
Traction Winch
Buoy Compartment
Energy Bridge™ Regasification Vessel





STL Buoy
Subsea Pipeline To Shore
Energy Bridge™ Regasification Vessel
Flexible Riser
Subsea Manifold
Anchor Lines

Terminali Offshore a piattaforma

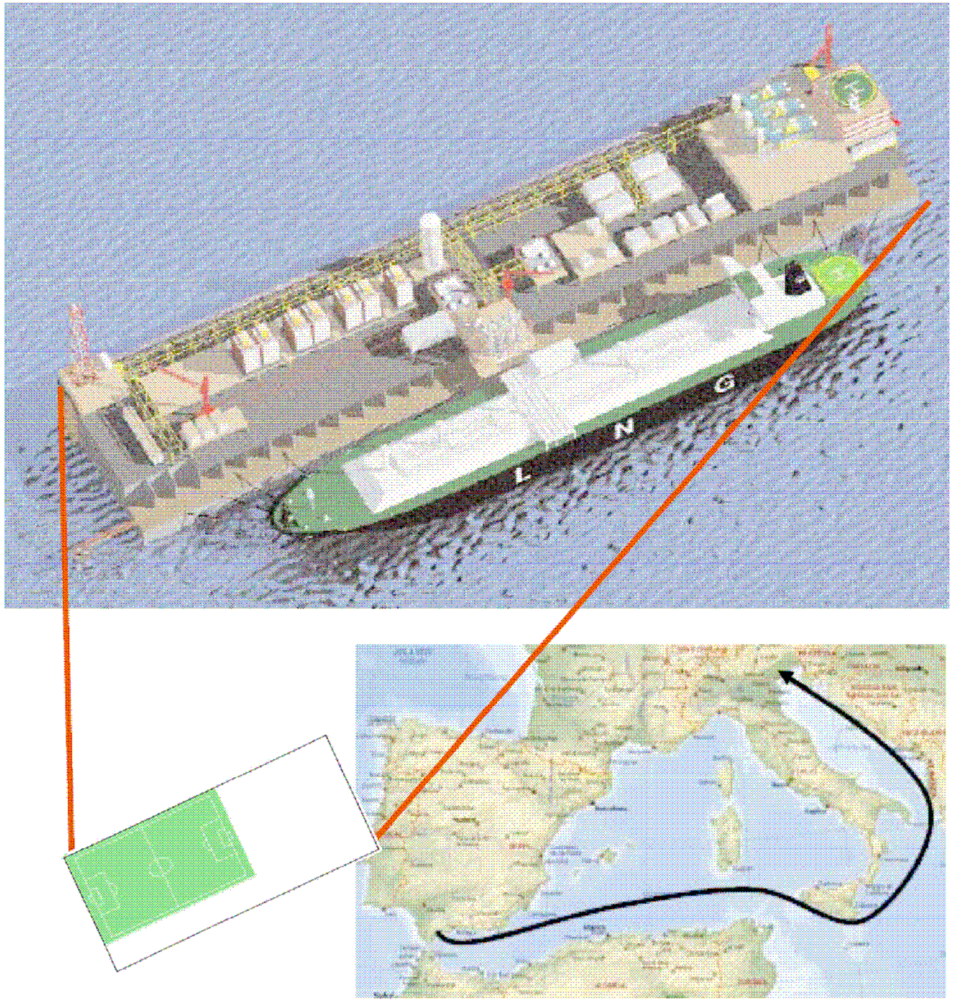
Disponibilità di spazi limitata.

In genere sviluppati su strutture pre-esistenti, piattaforme sviluppate originariamente per utilizzi estrattivi.

Gli impianti principali sono collocati sulla piattaforma, nel caso che non sia previsto accumulo nel terminal il GNL viene approvvigionato tramite le navi, rigassificato e immediatamente immesso in rete grazie alle pipeline sottomarine di collegamento.

Alcuni impianti prevedono un accumulo gassoso in caverna, senza questo accumulo è la rete stessa che deve essere in grado di fare da polmone assorbendo grandi quantità di gas in tempi relativamente ristretti e consentendo un approvvigionamento interrompibile.

Esempio: Il terminale Exxon di Rovigo – Porto Levante



Primo terminale offshore con struttura in cemento armato a gravità.

Sarà localizzato a circa 15 km al largo di Porto Levante (RO) posato su un fondale di 30m, praticamente invisibile dalla costa.

Entrerà in funzione nel 2008 con una capacità di 8 Mld m3/anno

Sarà sottoposto al monitoraggio sull'ambiente marino da parte dell'ICRAM

Partners (Qatar Petroleum 45%, ExxonMobil 45%, Edison 10%)

Circa 2/3 lavori sono completati, contratti assegnati per oltre 1 MLD Euro

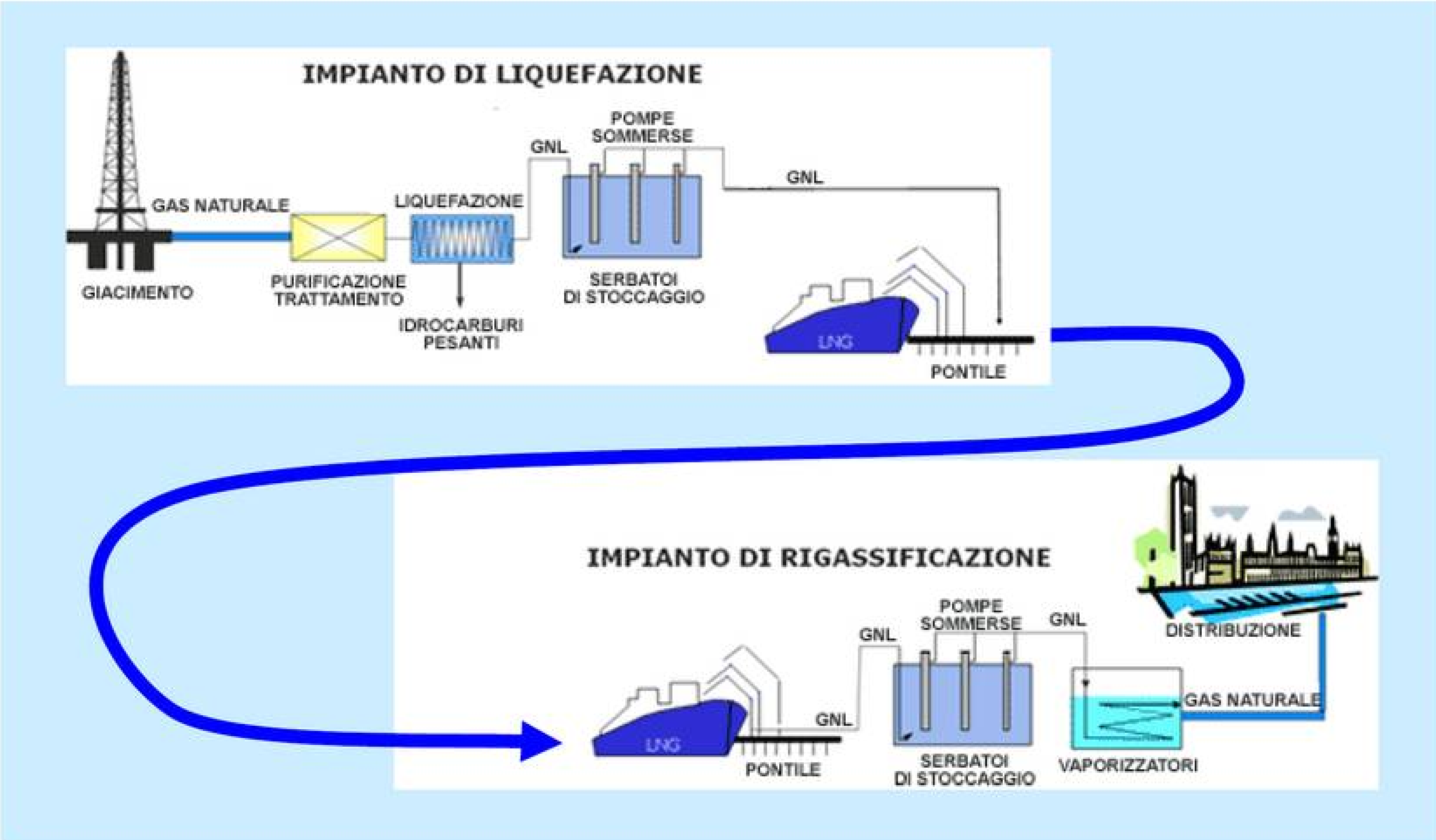
Verrà rimorchiato dalla Spagna

2,3 le dimensioni di un campo da calcio

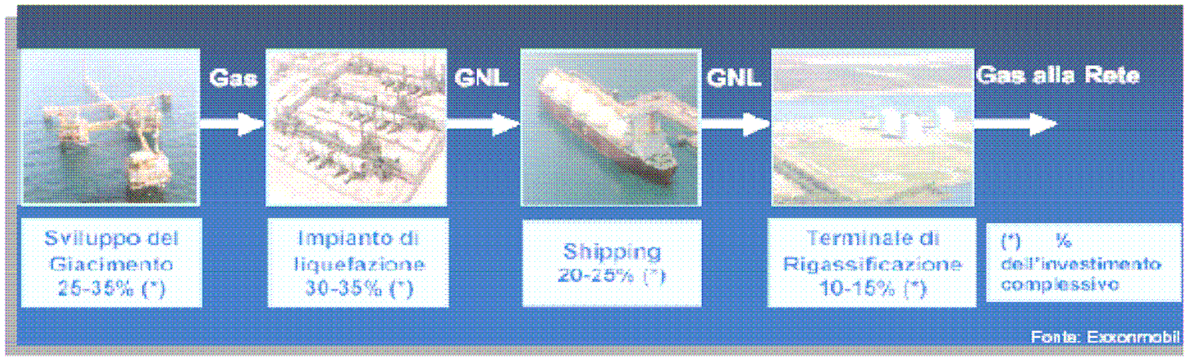
Prima di rigassificare bisogna liquefare: la catena e i costi

Prima di rigassificare bisogna liquefare: la catena e i costi

Terminali di esportazione, trasporto e terminali di importazione

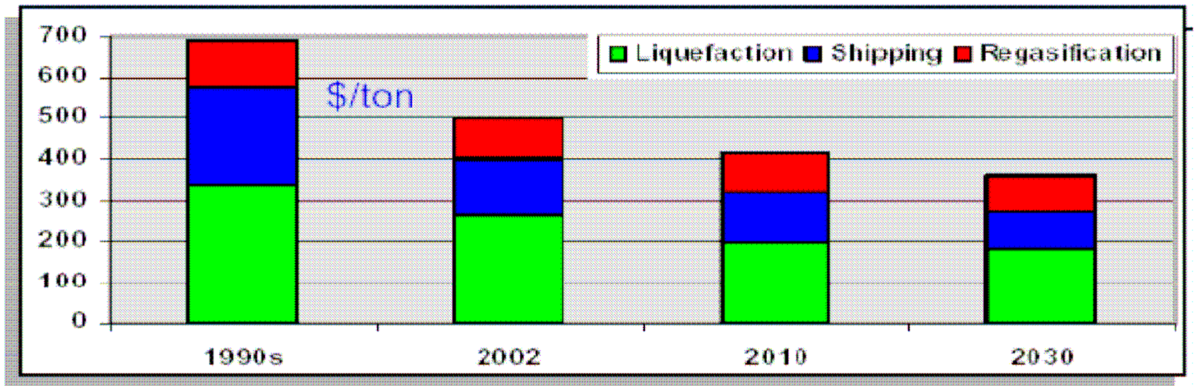


Costi economici della filiera GNL



Investimento TOT

2 – 5 G$



Inv. Specifico $/t

- 30 %

dal 1990 a oggi

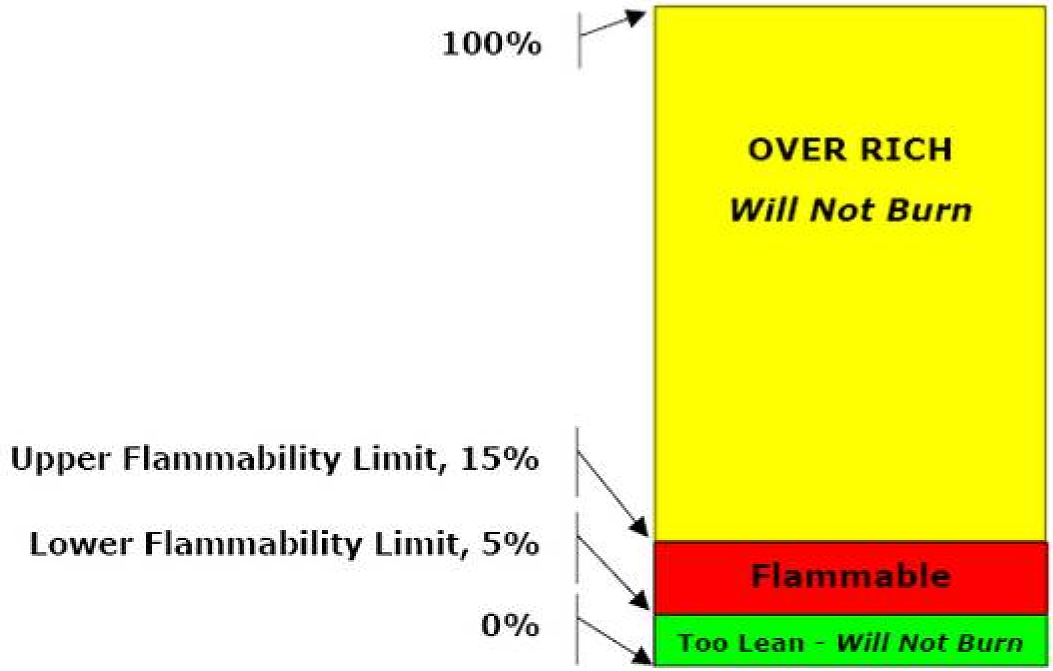
Siamo passati da 700$/t dei primi anni '90 fino agli attuali circa 500 $/t

Il vantaggio economico di trasporto GNL rispetto al gasdotto, si verifica per distanze > 2000 km nel caso di gasdotti sottomarini, e > 3800 km nel caso di gasdotti terrestri di grandi dimensioni.

ENEA

Le proprietà del GN e del GNL

Le proprietà del GN e del GNL


100%
OVER RICH
Will Not Burn
Upper Flammability Limit, 15%
Lower Flammability Limit, 5%
Flammable
0%
Too Lean - Will Not Burn

-162°C = -259°F

539°C = 1000°F

1ft = 30,48 cm

1Btu=1,055 kJ= 0,25 kcal = 0,3 wh

Table 1.1 Fire-related Properties of LNG and Other Light Hydrocarbon Fuels

Material		Ethylene[1,2]	Gasoline[1,3]	LNG/methane[1,2]	Propane (LPG)[1,2]
Flash Point (°F)		-186	-40 to -49	<-259	<-155
Flammability Limits (% in air)	LFL	2.7	1.3	5	2.1
	UFL	36	7.1	15	9.5
Autoignition Temperature (°F)		910	820	1000	840
Minimum Ignition Energy (BTU)		6.6×10^{-8}	Not reported	2.5×10^{-7}	2.4×10^{-7}
Fundamental Burning Velocity[4] (ft/s)		2.6	1.3	1.3	1.5
Vapor Specific Gravity		0.97	< 2	0.55	1.5

Terms:

Flash Point – The minimum temperature at which a liquid gives off vapor in sufficient concentration to form an ignitable mixture with air near the surface of a liquid, as specified by test.

Flammability Limits – The lowest (LFL) and highest (UFL) concentrations of a combustible substance in a gaseous oxidizer that will support burning.

Autoignition Temperature – Temperature at which a flammable mixture will spontaneously ignite.

Minimum Ignition Energy – The minimum amount of energy released at a point in a combustible mixture that causes flame propagation away from the point, under specified test conditions.

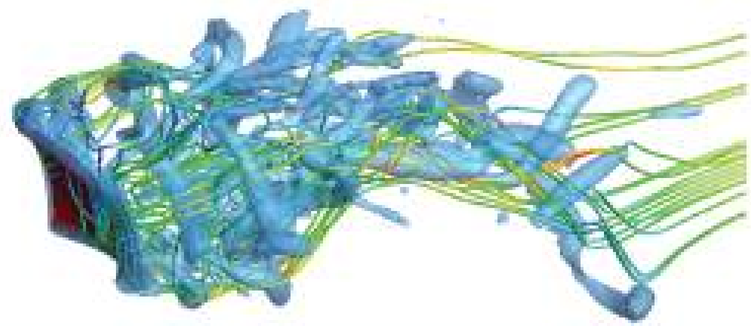
Fundamental Burning Velocity – The burning velocity of a laminar flame under test conditions. When ignited in a flammable vapor cloud, substances with lower fundamental burning velocities will tend to generate lower overpressures.

Vapor Specific Gravity – Ratio of the molecular weight of the material/compound to the molecular weight of air (based on an assumed composition of 79 vol% N_2 and 21 vol% O_2).

I modelli matematici
per valutare
la formazione,
la dispersione
e l'incendio
della nube fredda

Cosa significa CFD ?

- CFD = Computational Fluid Dynamics (Termofluidodinamica Computazionale)
- Utilizzata in molti settori (aeronautica ed aerospaziale, automobilistica, industria di processo, biomedicale etc.)
- In grande sviluppo dagli anni '80:
  - Piattaforme di calcolo
  - Algoritmi e Modelli
- Vantaggi e limiti



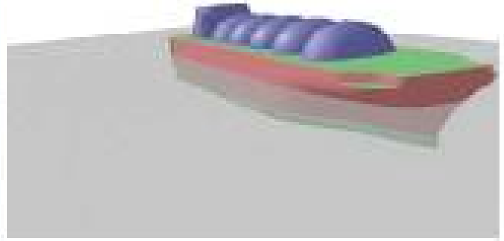
Experiments vs. Simulations

CFD gives an insight into flow patterns that are difficult, expensive or impossible to study using traditional (experimental) techniques

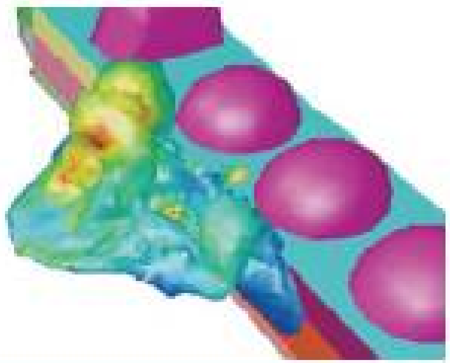
EXPERIMENTS	SIMULATIONS
Quantitative **description** of flow phenomena using measurements • for one quantity at a time • at a limited number of points and time instants • for a laboratory-scale model • for a limited range of problems and operating conditions Error sources: measurement errors, flow disturbances by the probes	Quantitative **prediction** of flow phenomena using CFD software • for all desired quantities • with high resolution in space and time • for the actual flow domain • for virtually any problem and realistic operating conditions Error sources: modeling, discretization, iteration, implementation

Esempi recenti di utilizzo di tecniche CFD:

- *D. Schowalter, 2006*



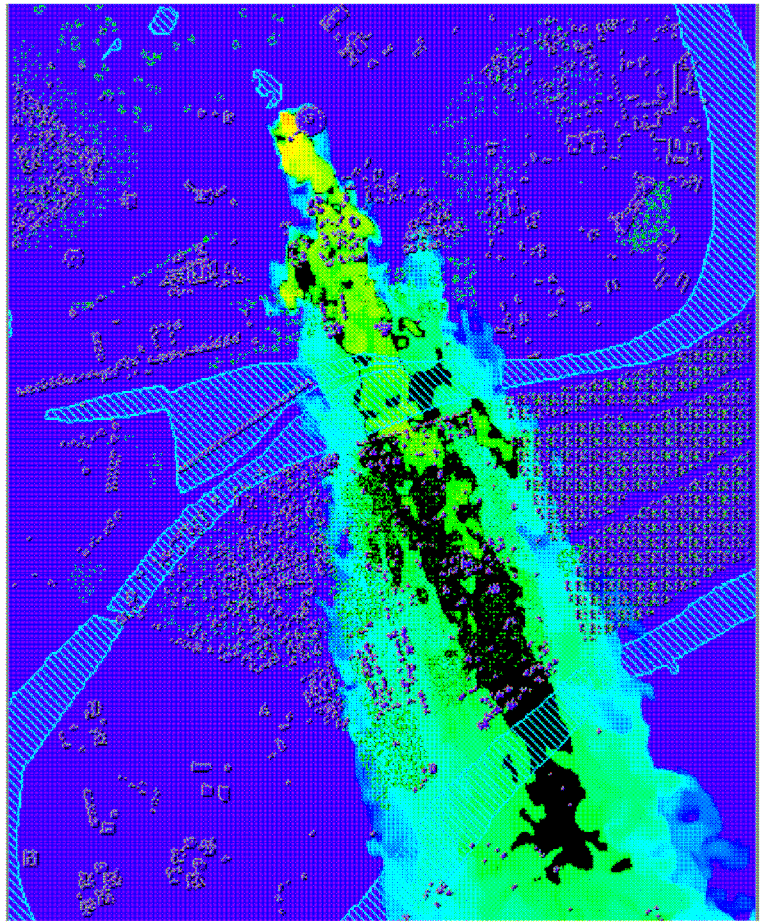
Incendio dopo 2 secondi



Incendio dopo 5 secondi

Examples of CFD applications

Smoke plume from an oil fire in Baghdad

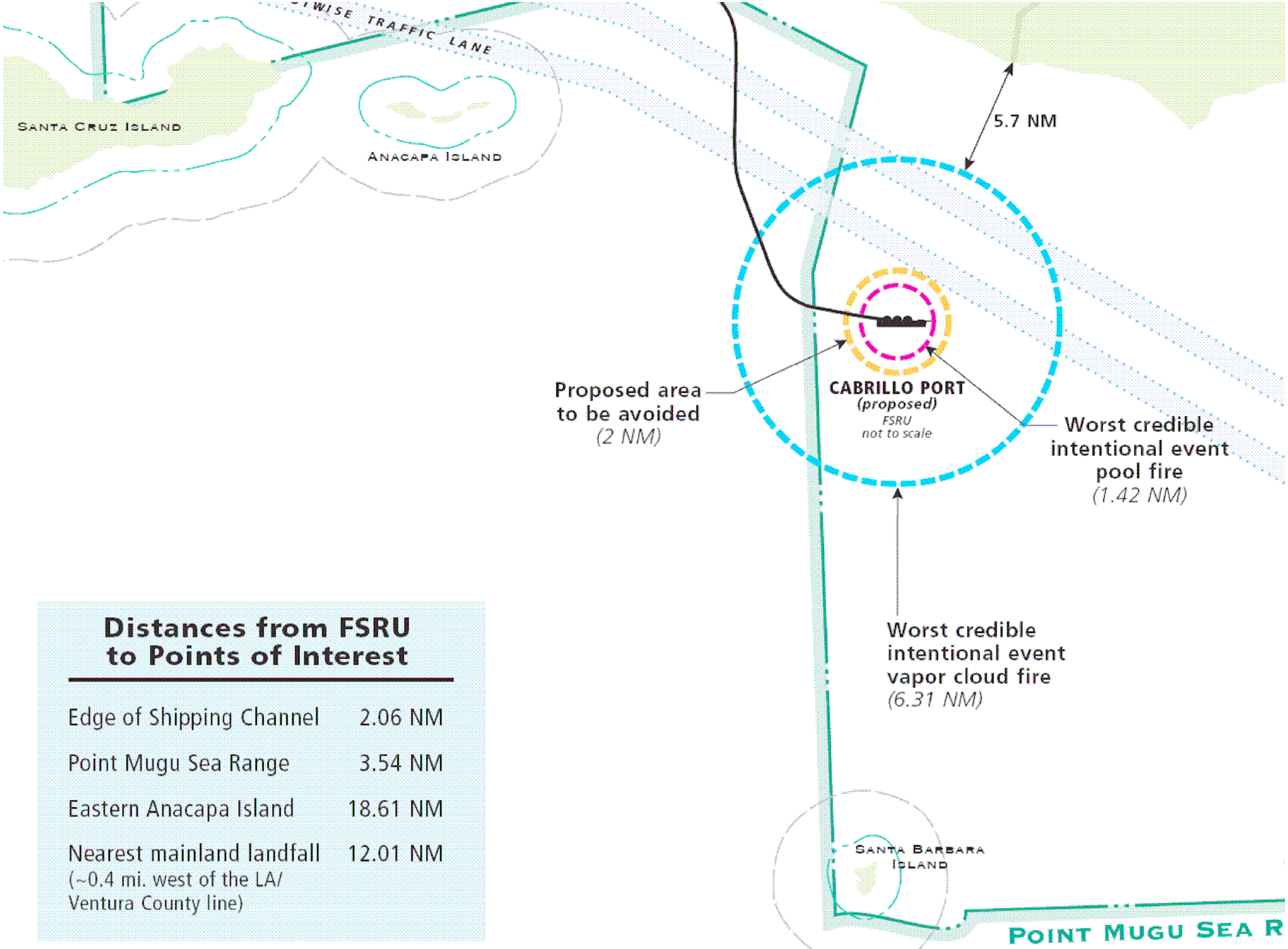


CFD simulation by Patnaik et al.

L'applicazione dei modelli e l'interpretazione dei dati

Studio di un caso

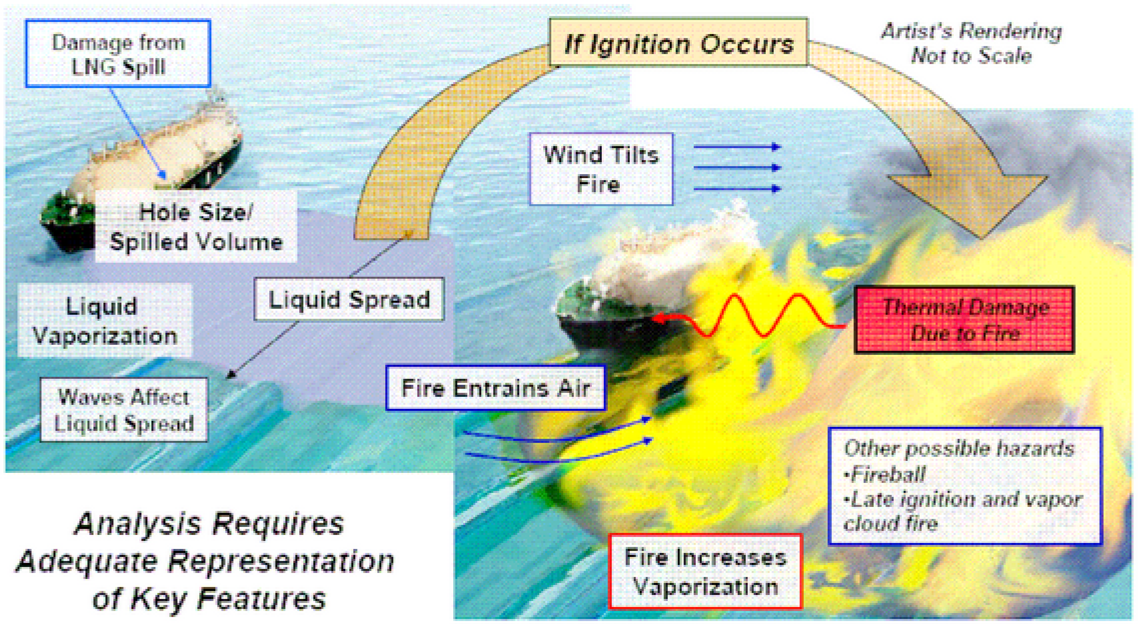
1NM = 1852 m



Distances from FSRU to Points of Interest

Edge of Shipping Channel	2.06 NM
Point Mugu Sea Range	3.54 NM
Eastern Anacapa Island	18.61 NM
Nearest mainland landfall (~0.4 mi. west of the LA/ Ventura County line)	12.01 NM

Key Features of LNG Spills Over Water



Analysis Requires Adequate Representation of Key Features

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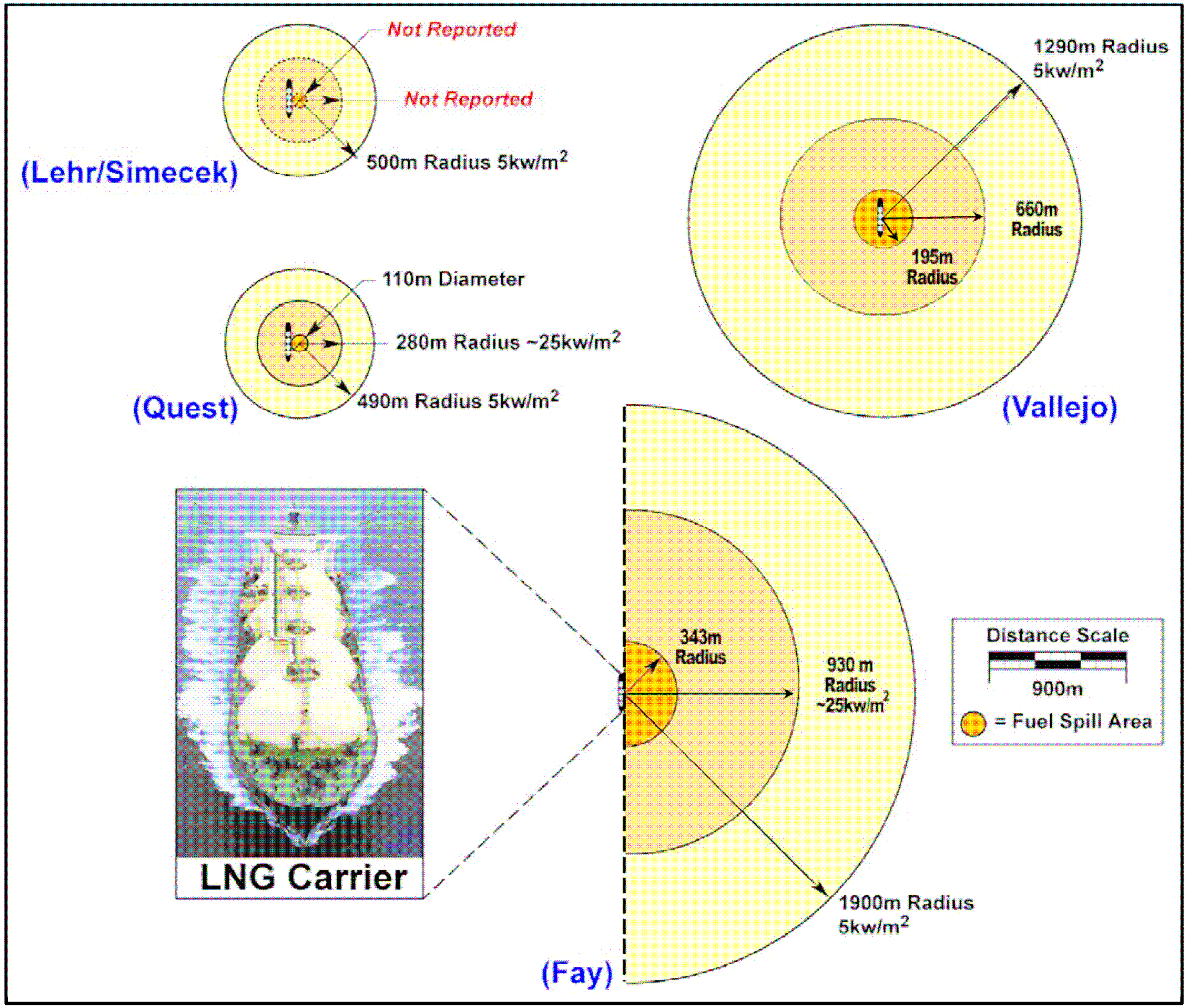


Figure 6. Graphical Summary of the Results of the *Lehr, Fay, Quest & Vallejo* Studies

(Yellow = $5kW/m^2$; lt. Orange = 25 kW/m^2; dk. Orange = fuel spill radius)

Table 6: Common, Approximate Thermal Radiation Damage Levels

Incident Heat Flux (kW/m^2)*	Type of Damage
35 – 37.5	Damage to process equipment including steel tanks, chemical process equipment, or machinery
25	Minimum energy to ignite wood at indefinitely long exposure without a flame
18 – 20	Exposed plastic cable insulation degrades
12.5 – 15	Minimum energy to ignite wood with a flame; melts plastic tubing
5	Permissible level for emergency operations lasting several minutes with appropriate clothing

*Based on an average 10 minute exposure time

[Barry 2002]

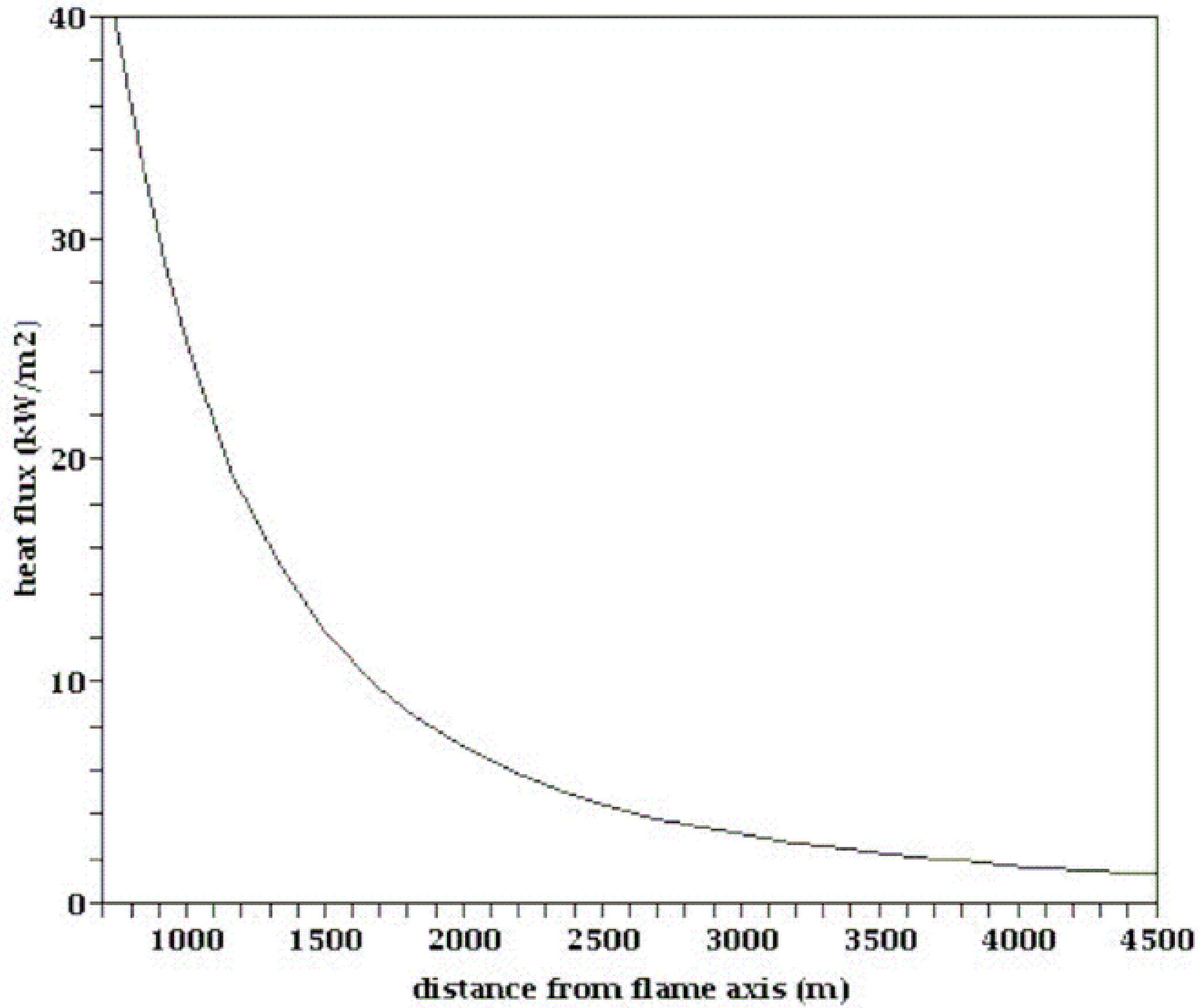
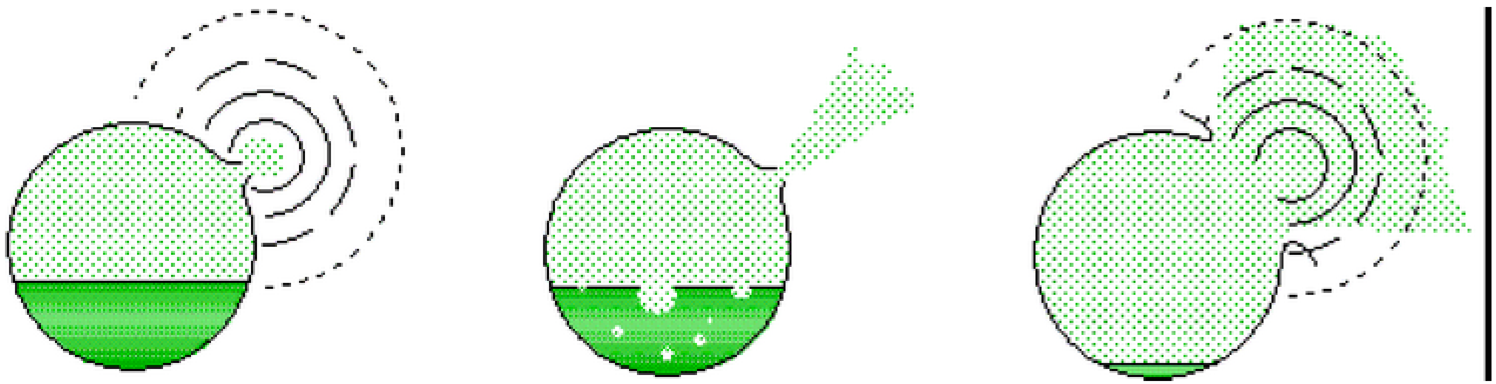


Figure 4: Sandia calculation of pool fire hazards.

La nube fredda

Se il contenitore si rompe per cause accidentali o per un danneggiamento, si può sviluppare la seguente situazione in tre fasi. Nella prima fase a causa della perforazione del serbatoio si ha una decompressione. Successivamente si ha una violenta ebollizione (trasformazione in gas del liquido) e un aumento della pressione nel serbatoio. Infine avviene una lacerazione catastrofica del serbatoio e la conseguente formazione di una nube di gas.



La nube di gas scivola sull'acqua più velocemente che sulla terraferma, come il ghiaccio sull'acqua. Se la nube trova un'accensione il suo potenziale distruttivo è innescato e si genera una nube di fuoco che può ustionare e creare incendi anche a grandi distanze.

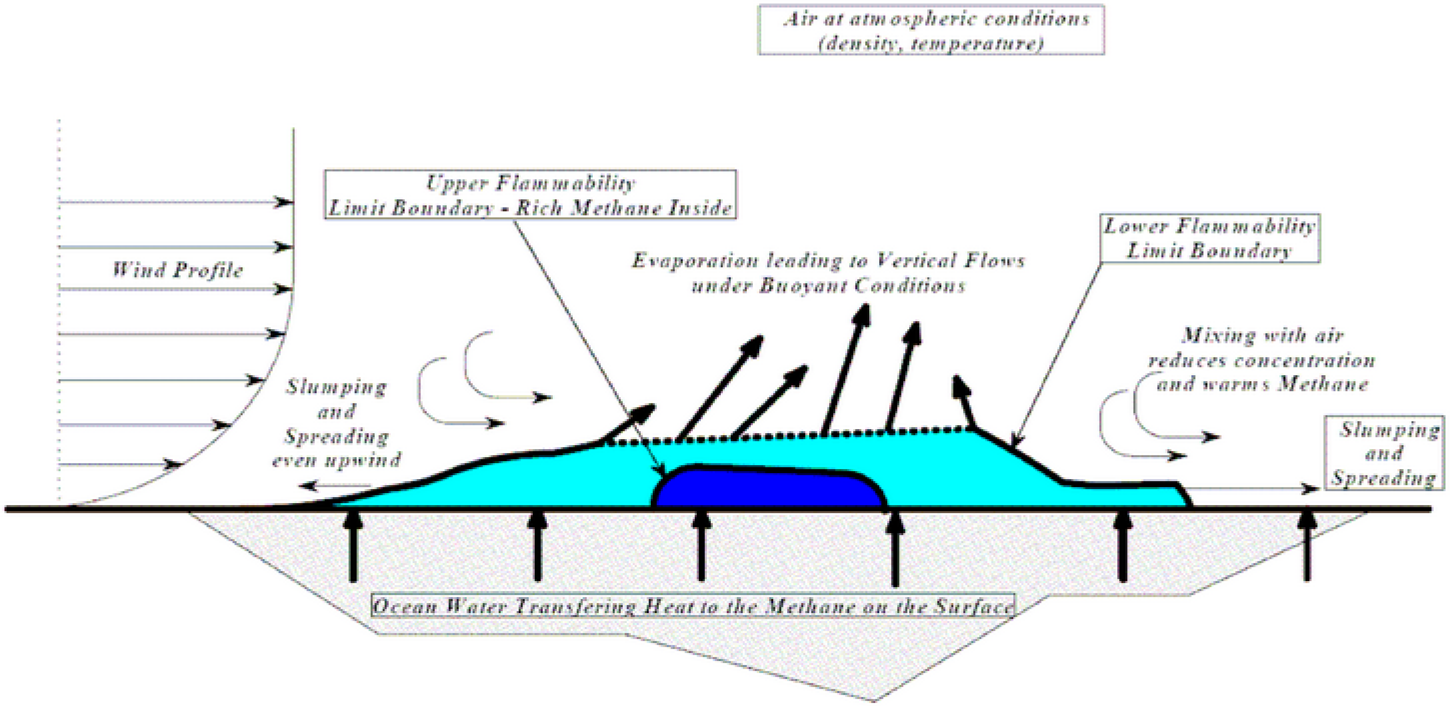


Figure 2.2 – LNG Dispersion Process

Flammable Vapor Cloud Ignition

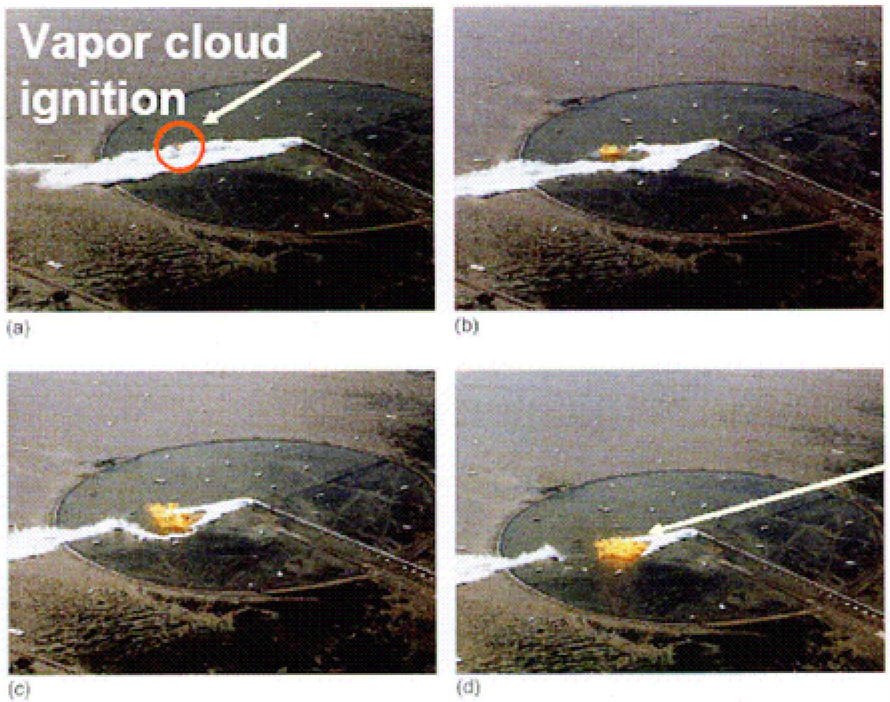


Plate 9 Maplin Sands trials of combustion of vapour clouds (Blackmore, Eyre and Summers, 1982; Hirst and Eyre, 1983): Trial 27: times from ignition: (a) 0 seconds; (b) 9 seconds; (c) 14 seconds; and (d) 16 seconds. Release of 32 m^3/min with wind speed 6 m/s (Reproduced by permission of Shell Research Ltd)

Flame does not spread to the entire cloud

Table 4.2-1 Summary of FSRU Accident Consequences

	Marine Collision[b]	Intentional[b]	Escalation[c,d]	
Breach size	1300 m^2 of area	7m^2 & 7m^2	7m^2 & 1300 m^2	7m^2 & 2x1300 m^2
Number of tanks	50% volume of 1 tank	2	2	3
Release quantity (gal / m^3)[e]	13,000,000 / 50,000	53,000,000 / 200,000	40,000,000 / 150,000	53,000,000 / 200,000
	Pool Spread Distance			
Distance down range (NM / miles / m)	0.40 / 0.45 / 730	0.35 / 0.40 / 650	0.33 / 0.38 / 610	0.43 / 0.50 / 800
	Pool Fire			
Radiative flux distance > 5 kW/m^2 (NM / miles / m)	1.60 / 1.85 / 2,970	1.42 / 1.64 / 2,640	1.35 / 1.56 / 2,510	1.74 / 2.01 / 3,230
Radiative flux distance > 12.5kW/m^2 (NM / miles / m)	0.99 / 1.14 / 1,830	0.87 / 1.01 / 1,620	0.83 / 0.96 / 1,540	1.07 / 1.24 / 1,990
Radiative flux distance > 37.5kW/m^2 (NM / miles / m)	0.49 / 0.57 / 910	0.44 / 0.50 / 810	0.42 / 0.48 / 770	0.54 / 0.62 / 1,000
	Vapor Cloud Dispersion (No Ignition)			
Average flammable height (feet / m)	69.9 / 21	98 / 30		
Maximum distance to LFL (NM / miles / m)	2.85 / 3.29 / 5,290	6.03 / 6.95 / 11,175	Immediate Ignition	
Time for maximum distance (min)[a]	50	89		
	Vapor Cloud (Flash) Fire		No Vapor Cloud Hazard	
Radiative flux distance > 5 kW/m^2 (NM / miles / m)[f]	3.57 / 4.11 / 6,610	6.31 / 7.27 / 11,700		
Radiative flux distance > 12.5kW/m^2 (NM / miles / m)[f]	3.29 / 3.79 / 6,100	6.21 / 7.15 / 11,500		
Radiative flux distance > 37.5kW/m^2 (NM / miles / m)[f]	3.06 / 3.52 / 5,670	6.12 / 7.05 / 11,340		

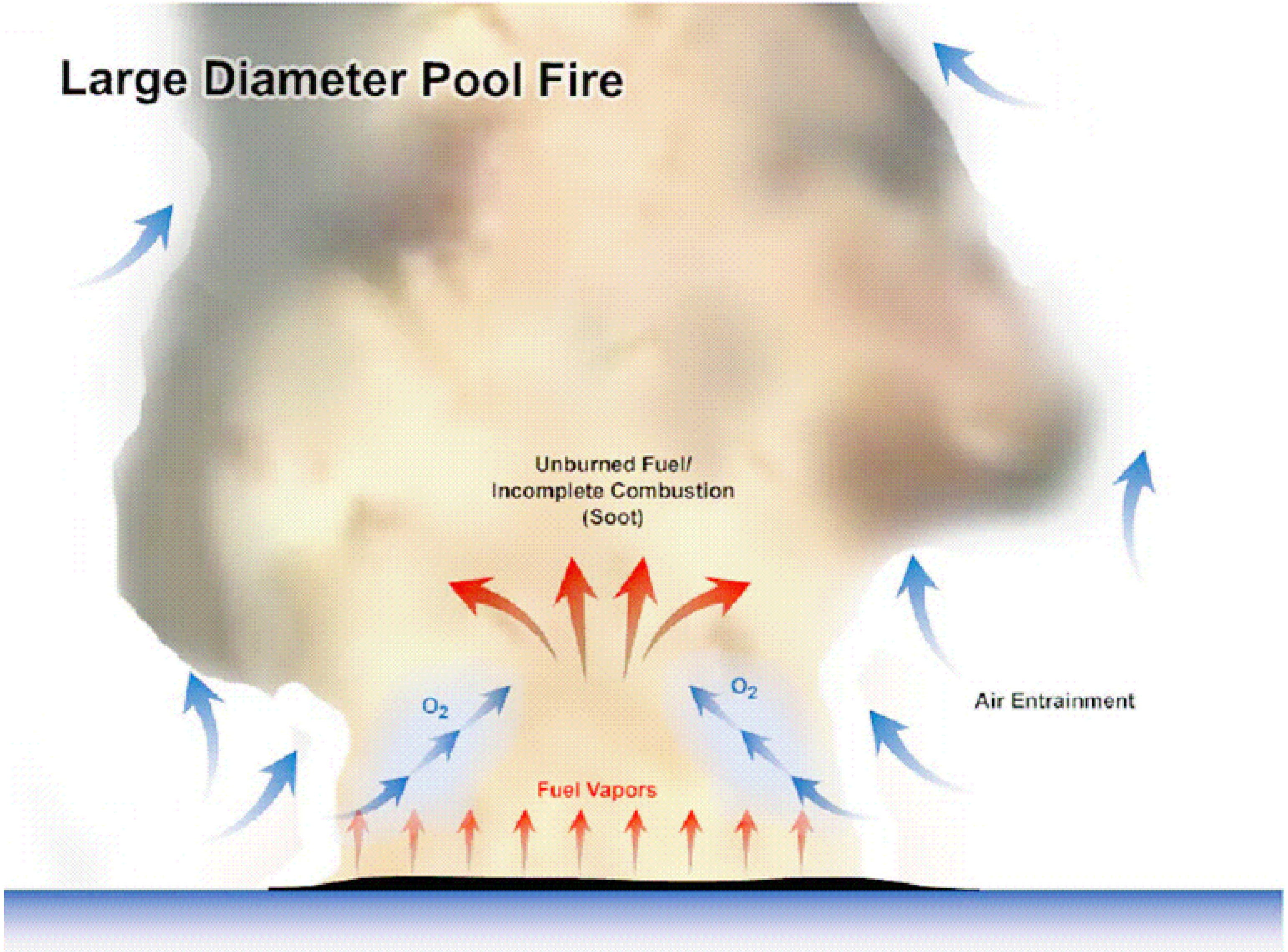
Source: Risknology 2006, Table 3.8 (see Appendix C1).

Notes:

Pool fires and vapor cloud fires are mutually exclusive.
All radiative flux distances given from release location.
LFL = lower flammability limit; NM = nautical miles; m = meters.
Wind speed = 2 meters per second; temperature = 21 °C.
[a]Time includes liquid dispersion and evaporation.
[b]Mass balance flux rate = 0.282 kg/m^2 sec.
[c]Mass balance flux rate = 0.135 kg/m^2 sec.
[d]The escalation case was modeled as a pool fire resulting from a breach of secondary containment due to the effects of a fire. Since ignition is guaranteed, no dispersion cloud develops.
[e]Tank volume of 100,000 m^3 is used for ease of calculations; actual tank volume is 90,800 m^3.
[f] See Section 4.2.7.2 for definitions of radiative flux levels.

Table 5: Final Dispersion Results

Scenario	Wind speed (m/s)	Max distance to LFL (m)
2-tank, 7 m^2 hole	2	11,175
	4	9,420
	6	8,280


Large Diameter Pool Fire
Unburned Fuel/
Incomplete Combustion
(Soot)
O2
O2
Air Entrainment
Fuel Vapors


L N G

La sicurezza
per i cittadini

A Guide to LNG

Liquefied Natural Gas

What All Citizens Should Know

Federal Energy
Regulatory Commission
Office of Energy Projects
Washington, DC
www.ferc.gov/industries/lng.asp

Security for LNG Facilities and Ships

FERC is among several federal agencies overseeing the security of LNG import terminals and peakshaving plants. The Coast Guard has lead responsibility for LNG shipping and marine terminal security. DOT's Pipeline and Hazardous Materials Safety Administration and the Department of Homeland Security's Transportation Security Administration have security authority for LNG peakshaving facilities. In addition to federal agencies, state and local authorities (police and fire departments) provide security assistance at LNG facilities.

FERC coordinates closely with these other agencies when evaluating security issues as part of its *Cryogenic Design Review* Process.

Security measures for both onshore and offshore portions of marine terminals are required by Coast Guard regulations under the Maritime Transportation Security Act. Requirements for maintaining security of LNG import terminals are in the Coast Guard regulations at 33 CFR Part 105.

Potential Thermal and Dispersion Hazards for Spills from Large LNG Vessels

HOLE SIZE (m^2)	TANKS BREACHED	POOL DIAMETER (m)	DISTANCE TO 37.5 kW/m^2 (m)	DISTANCE TO 5 kW/m^2 (m)
Thermal Distances for Potential Intentional Events				
7	2	640	~750	~2500

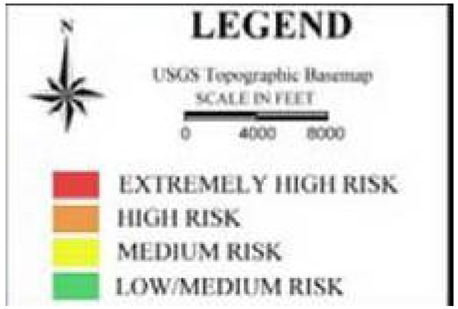
HOLE SIZE (m^2)	TANKS BREACHED	WIND SPEED (m/sec)	DISTANCE TO LFL (m)
Dispersion Distances for Potential Intentional Events			
7	2	2	~10,000
7	2	6	~7,000

Example hazard distances are for intentional spills of ~200,000 m^3 of LNG in open areas without risk management

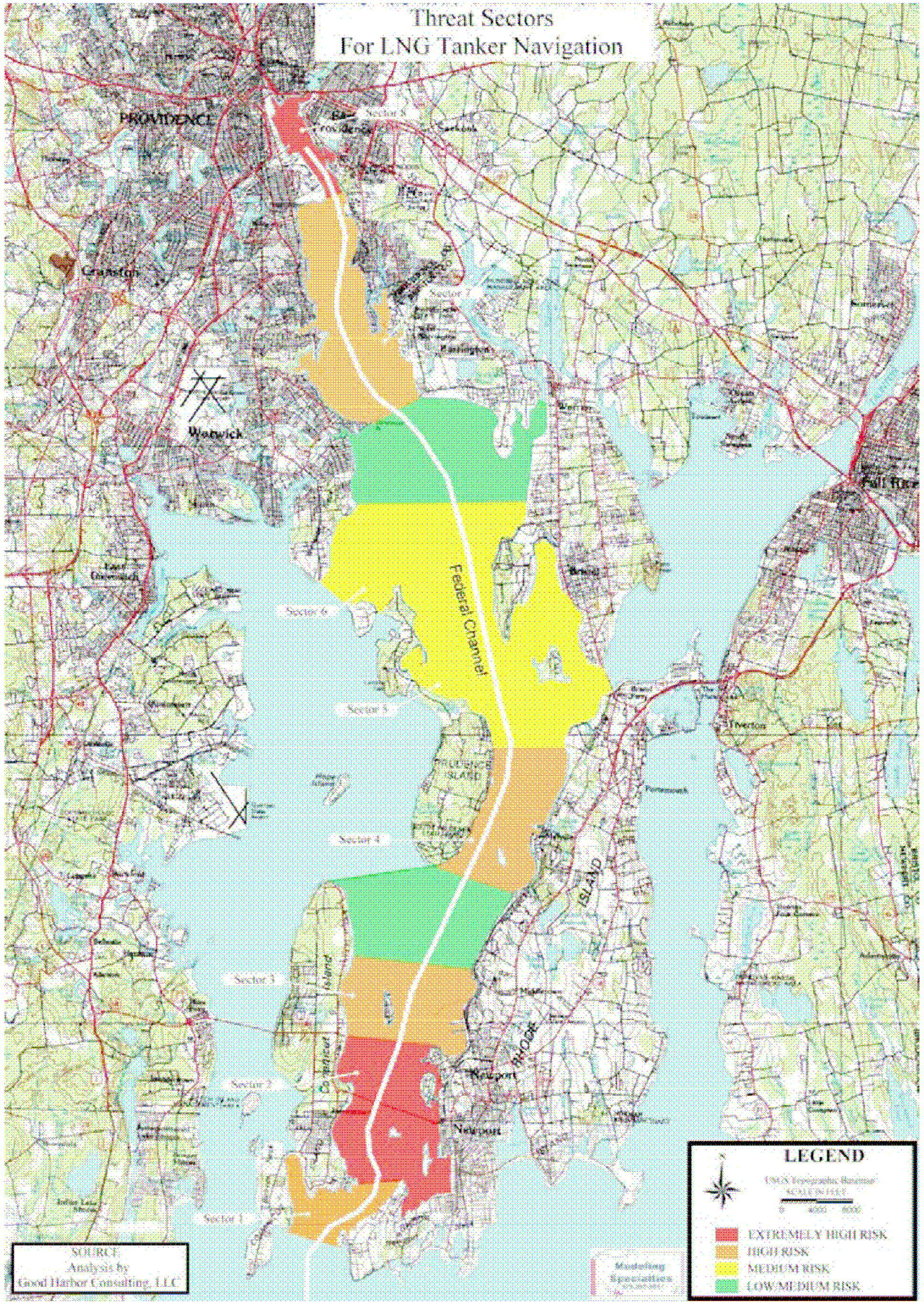
Sandia National Laboratories

	Vapor Cloud Dispersion (No Ignition)	
Average flammable height (feet / m)	69.9 / 21	98 / 30
Maximum distance to LFL (NM / miles / m)	2.85 / 3.29 / 5,290	6.03 / 6.95 / 11,175
Time for maximum distance (min)[a]	50	89
	Vapor Cloud (Flash) Fire	
Radiative flux distance > 5 kW/m^2 (NM / miles / m)[f]	3.57 / 4.11 / 6,610	6.31 / 7.27 / 11,700
Radiative flux distance > 12.5kW/m^2 (NM / miles / m)[f]	3.29 / 3.79 / 6,100	6.21 / 7.15 / 11,500
Radiative flux distance > 37.5kW/m^2 (NM / miles / m)[f]	3.06 / 3.52 / 5,670	6.12 / 7.05 / 11,340

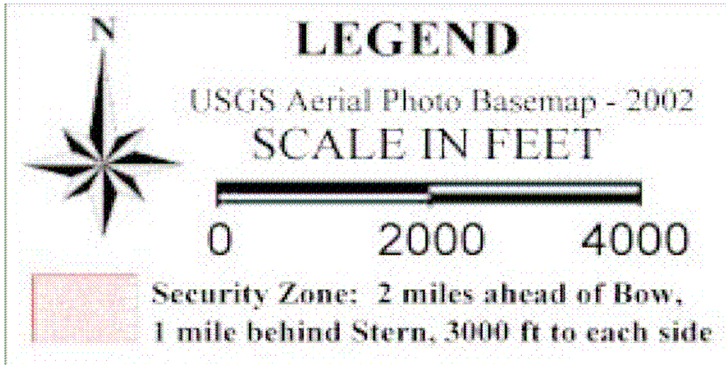
Fire and Vapor Dispersion Hazard Issues	
The analytical technique employed for dispersion calculations in the IRA is sensitive to domain scale and boundary conditions and must be carefully assessed.	Domain scale and boundary conditions were reassessed and identified problems were addressed with more detailed analysis, comparison with other numerical approaches, and validation with experimental data.
Initial IRA calculations for potential dispersion distances appeared to under predict hazard distances.	Dispersion scenarios were analyzed using more appropriate input parameters, computational domains, and boundary and site-specific environmental conditions. The final results obtained were consistent with results from other numerical models.
General application of the modeling technique used in the IRA for dispersion calculations and hazard estimates should be reviewed for appropriateness.	The selected analytical approach was carefully reviewed and evaluated against experimental data and found to provide results consistent with best available computational fluid dynamics methodologies.
Fire hazard evaluations were not included in the initial draft IRA. Since the likelihood of ignition of a large spill is possible, fire hazard analyses should be conducted.	Fire hazard analyses were developed using appropriate large-scale fire modeling analytical approaches. The results obtained are consistent with other large-scale LNG fire analyses for spills over water.



LEGEND
N
USGS Topographic Basemap
SCALE IN FEET
0
4000
8000
EXTREMELY HIGH RISK
HIGH RISK
MEDIUM RISK
LOW/MEDIUM RISK



Map 2.1: Threat Sectors for LNG tanker transit.


N
LEGEND
USGS Aerial Photo Basemap - 2002
SCALE IN FEET
0
2000
4000
Security Zone: 2 miles ahead of Bow,
1 mile behind Stern, 3000 ft to each side

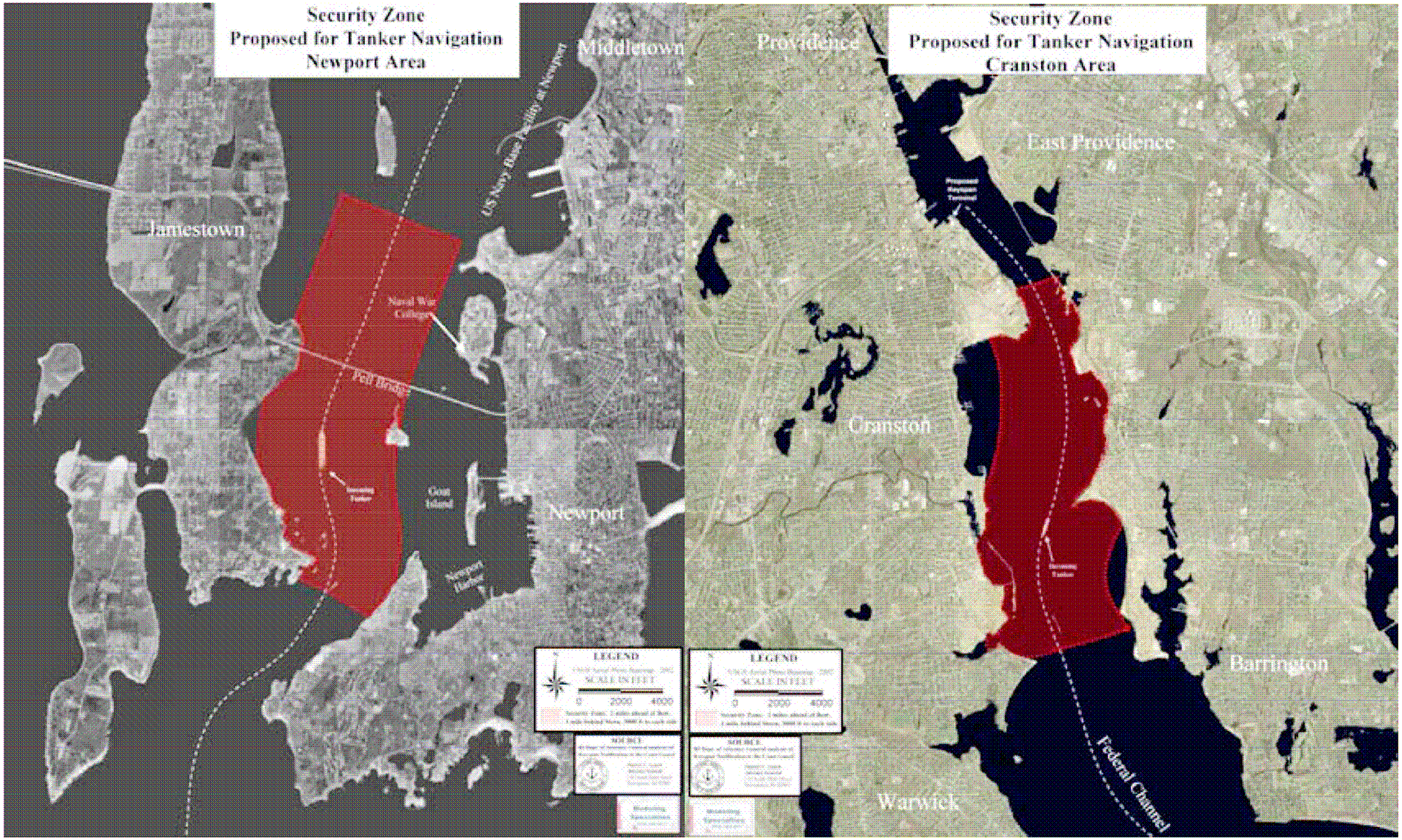
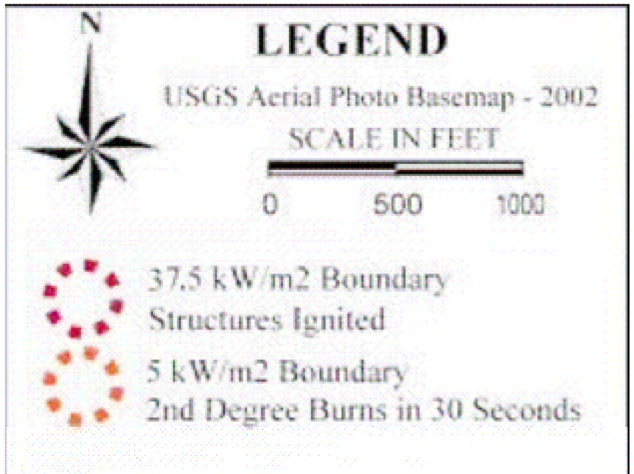
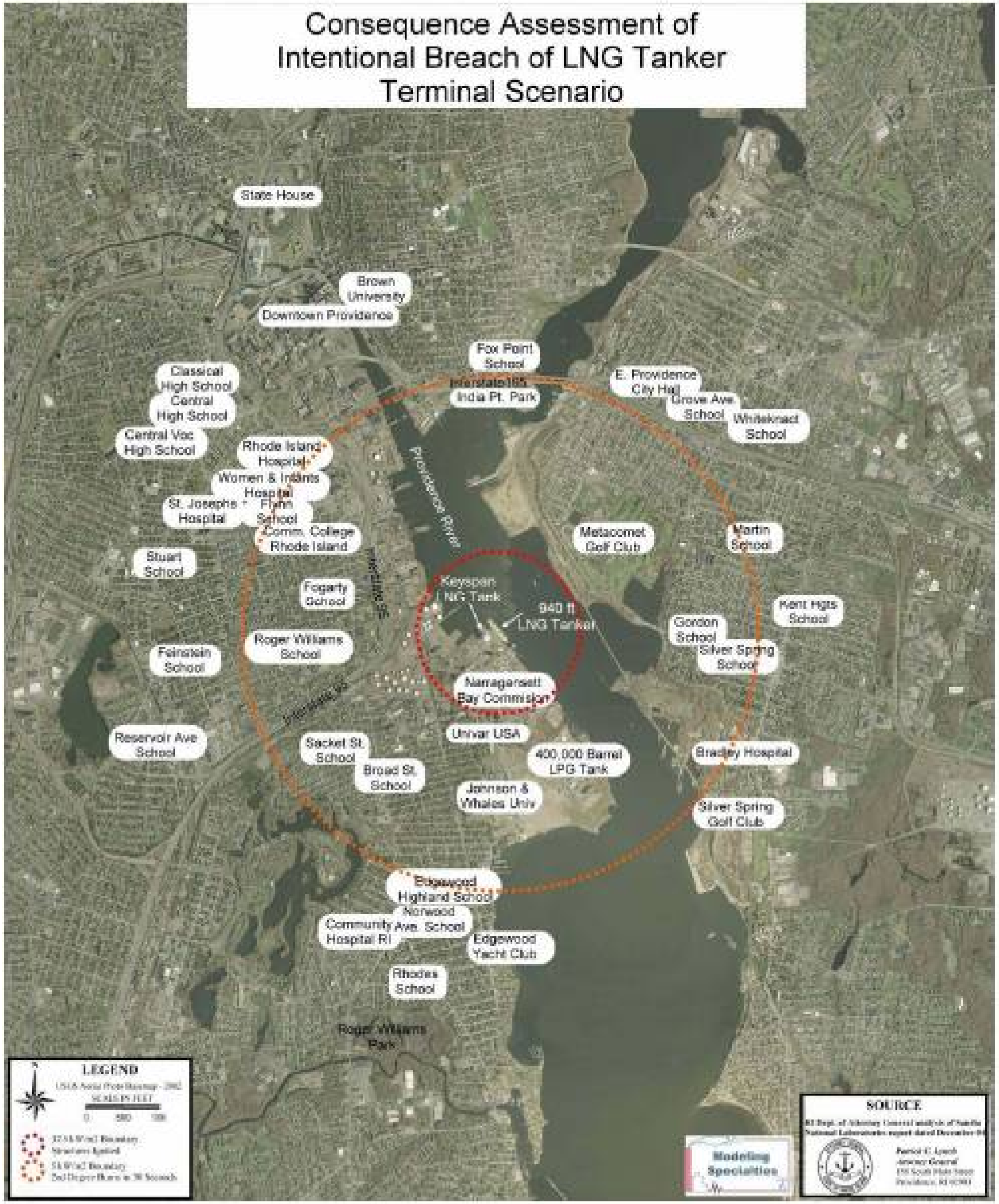


Figure 1.6: Proposed Security Zones for Newport, RI, and Cranston, RI


N
LEGEND
USGS Aerial Photo Basemap - 2002
SCALE IN FEET
0
500
1000
37.5 kW/m2 Boundary
Structures Ignited
5 kW/m2 Boundary
2nd Degree Burns in 30 Seconds



Map 3.2: Satellite image of KeySpan facility, indicating various schools, hospitals, and industrial facilities.

Table 5: Examples of Potential LNG Transportation Safeguards and Impacts

SAFEGUARD ACTION	RISK REDUCTION	RESIDUAL RISKS	CONSEQUENCE IMPROVEMENT	COST OF SAFEGUARD APPROACH	OPERATIONAL IMPACTS
Smaller LNG tankers	Potential smaller fire size and shorter fire duration	Thermal hazards from small fire, higher accident potential with increased shipments	potential reduction in hazard zone and reduced impacts on public safety and property	Increased shipping costs, increased energy costs	Increased number of shipments, additional port disruption
Evacuation during LNG shipments	Reduce hazards to people from potential spill	Hazards to property from a fire, accidents during evacuation	Reduce injuries and deaths from potential fire	Labor intensive, increased costs for emergency services	Disruption of evacuees
Remote terminal and pipeline	Reduce impacts on public safety and property from potential fire	Impact on public safety and property from potential pipeline leaks	potential reduction in hazards from large-scale or catastrophic fire	potential high capital costs, increased energy costs	Pipeline vulnerability issues

Table 1: Representative Options for LNG Spill Risk Reduction

IMPACT ON PUBLIC SAFETY	REDUCTION IN EVENT POTENTIAL (Prevention)	IMPROVE SYSTEM SECURITY AND SAFETY (Mitigation)	IMPROVED HAZARD ANALYSIS (Reduce Analytical Uncertainties)	RESULTANT RISK REDUCTION
High and Medium	▪ Early off-shore interdiction ▪ Ship inspection ▪ Control of ship, tug and other vessel escorts ▪ Vessel movement control zones (safety/security zones) ▪ One-way traffic ▪ LNG offloading system security interlocks	▪ Harbor pilots ▪ Ship and terminal safety and security upgrades ▪ Expanded emergency response and fire fighting to address fires, vapor clouds, and damaged vessels	▪ Use of validated CFD models for LNG spill and thermal consequence analysis for site specific conditions ▪ Use of CFD and structural dynamic models for spill/structure interactions	Combination of approaches to reduce risks to acceptable levels
Low	Use of existing best risk management practices on traffic control, monitoring & safety zones	Use of existing best risk mitigation practices to ensure risks remain low	Use of appropriate models to ensure hazards are low for site-specific conditions	Combination of approaches to ensure risks are maintained at acceptable levels

Esiste anche il terrorismo

Shoulder or aircraft-fired missile or other tactical weapons	The double hulls of the FSRU and LNG carriers would be robust. Penetration of one tank could result in consequences similar to the marine collision (one-tank) release scenario. The two-tank, 7 square-meter (m^2) scenario is based on one missile and then a second missile successfully penetrating LNG tanks on the FSRU or LNG carrier. Sandia recommended this scenario based on emerging guidance from the U.S. Department of Homeland Security (DHS) and from the intelligence community as noted in the Sandia report and the associated classified report on possible intentional threats ("Threat and Breach Analysis of an LNG Ship Spill Over Water" Sandia National Laboratories, May 2005 [SECRET]). Worst credible case is addressed in the intentional (two-tank) and/or escalation (three-tank) scenario.
Bomb delivery by small craft	A successful attack could result in potential loss of containment on both the LNG carrier and FSRU with possible ignition and major fire. The potential consequences are evaluated in the escalation (two or three-tank) scenario. The ATBA and the safety zone would be patrolled and would deter intruders in accordance with the security plan. Successful delivery in this manner would be unlikely.
Assault on FSRU by diver(s)	The distance of the FSRU and LNG carriers offshore make this event unlikely. Patrol vessels would warn vessels in the ATBA and deter vessels from the safety zone. However, if successful, the consequences would be similar to those of the marine collision (one-tank) release scenario or in the worst credible case, the escalation (two or three-tank) scenario.
Deliberate release of unignited LNG offshore.	Considered in the hazard identification workshop. Correlated to intentional event (two-tank) vapor cloud dispersion and flash fire.
Other Events	
Errant missiles from US Navy complex could strike the FSRU or an LNG carrier	BHPB would coordinate activities with the U.S. Navy to avoid conflicts with Navy activities. Errant missiles rarely if ever occur, and an errant missile striking the FSRU or an LNG carrier is highly improbable. The escalation (two or three-tank) scenario would address the consequences.
Dragging an anchor over a subsea pipeline	The pipelines could be damaged resulting in a leak of natural gas. The loss of pressure would be monitored at the FSRU and would induce the safe shut-down of the system, and natural gas would rise to the surface. Few ignition sources exist in the vicinity of the proposed offshore pipelines. The natural gas would also be odorized at the FSRU.

The M136 AT4's warhead has excellent penetration ability and lethal after-armor effects. The extremely destructive, 440 gram shaped-charge explosive penetrates more than 14 inches (35.6 cm) of armor. [102]

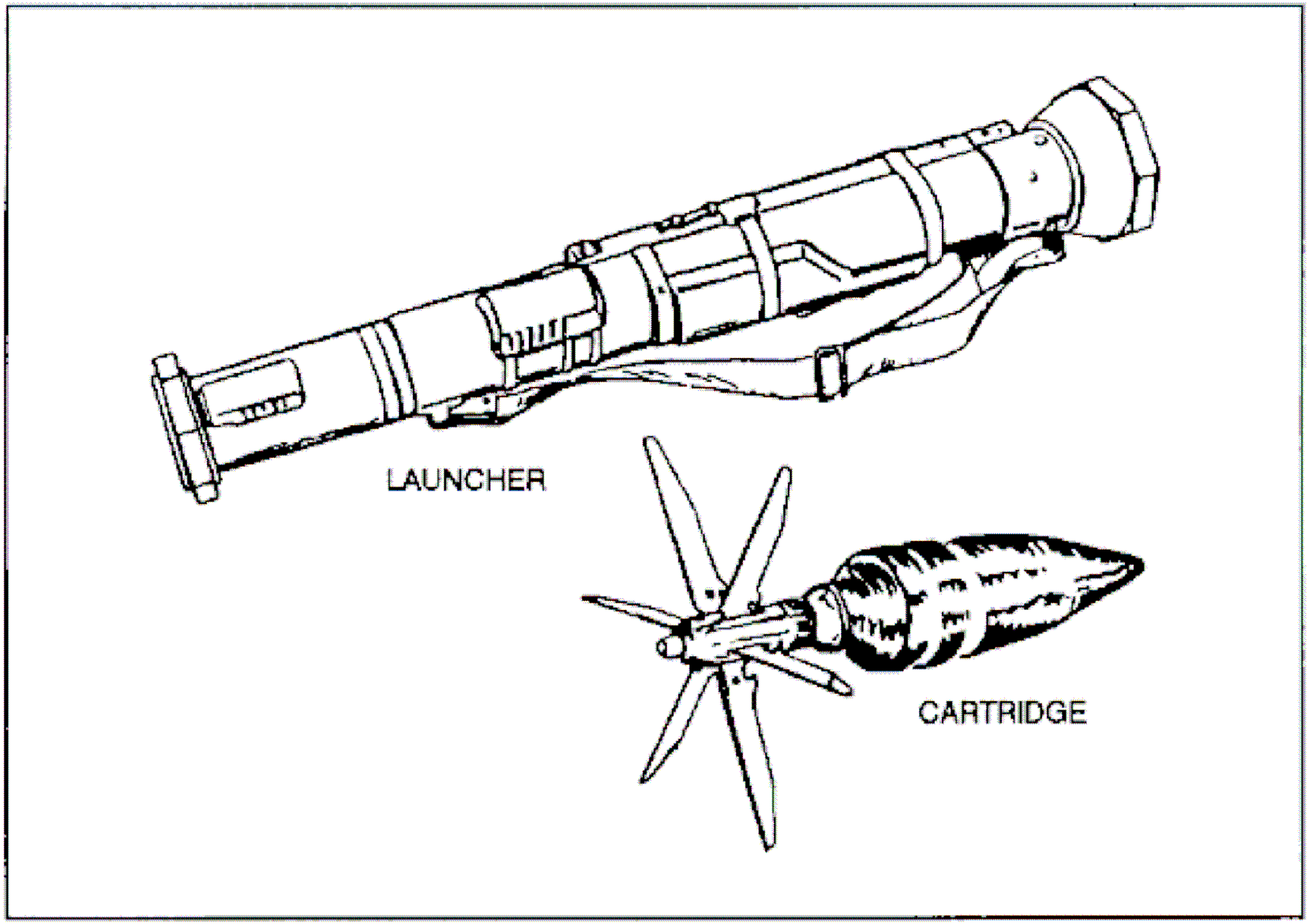
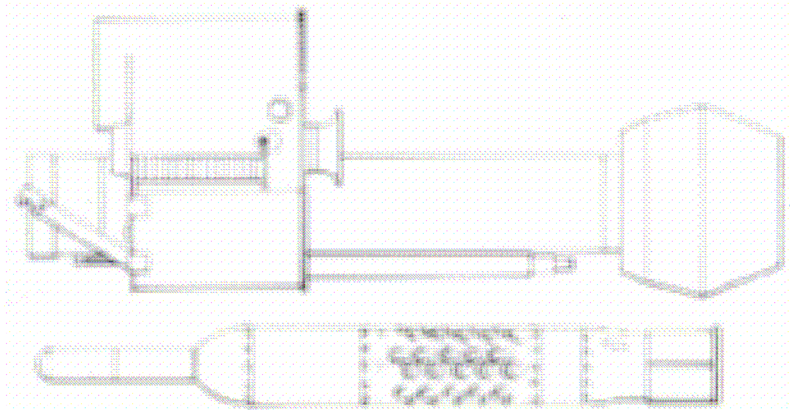
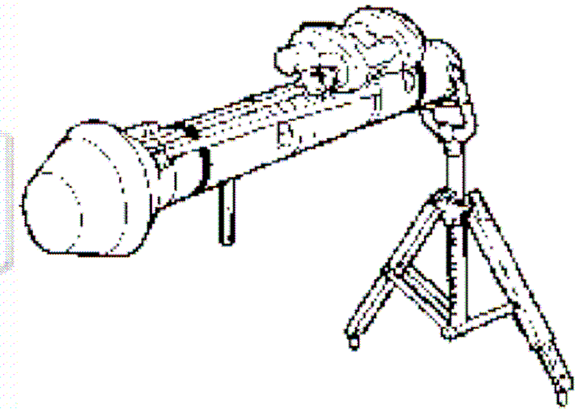


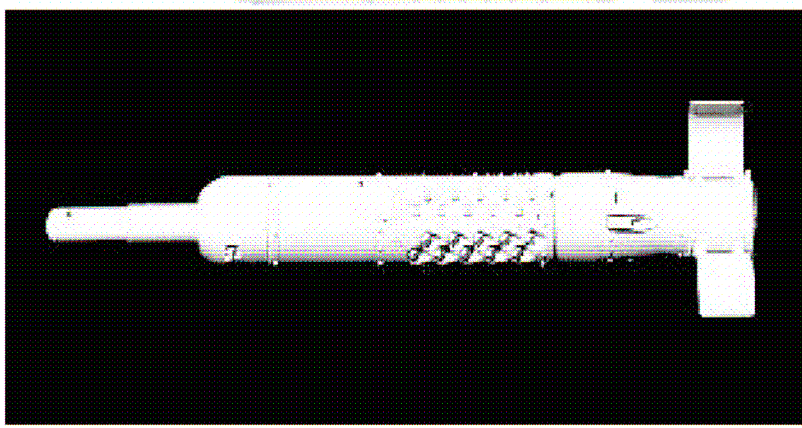
Figure 3-1. Launcher and HEAT cartridge.

M-47 DRAGON Anti-Tank Guided Missile

The Dragon is a medium range, wire-guided (guidance of the missile to target is controlled by a thin wire), line-of-sight anti-tank/assault missile weapon capable of defeating armored vehicles, fortified bunkers, concrete gun emplacements and other hard targets.. It is designed to be carried and fired by an individual gunner. [103]







Dragon guided missile.

Shoulder-Launched Multipurpose Assault Weapon (SMAW)

E c'è anche il

cyber attack!

Do you remember Black September, 4 agosto 1972?