APPENDIX N
INTENTIONAL DESTRUCTIVE ACTS

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The purpose of this appendix is to evaluate the human health impacts of intentional destructive acts (IDAs) at the Western New York Nuclear Service Center (WNYNSC). The term “IDA” is used to include intentional malevolent acts, intentional malicious acts, and acts of terrorism.

N.1 Introduction

In accordance with recent U.S. Department of Energy (DOE) National Environmental Policy Act (NEPA) guidance (DOE 2006), this appendix was developed to explicitly consider the potential impacts of IDAs in NEPA documents. A wide range of IDA scenarios involving the release of radiological or toxic chemical materials can be postulated for WNYNSC. Each involves an action by intruders or insiders that affects existing inventories and their distribution at one of the waste management areas (WMAs) or during the transportation of radioactive waste packages from WNYNSC. The human health impacts of an IDA are directly related to the magnitude of radiological or chemical material available for dispersal, as well as the means of dispersing it to the environment. Other factors that affect impacts include population density, distance to the population, and meteorology. Appendix I of this environmental impact statement (EIS) identifies five types of accidents at WNYNSC: high-level radioactive waste tanks in the Waste Tank Farm (WMA 3); the Main Plant Process Building (WMA 1); radioactive waste packages; the U.S. Nuclear Regulatory Commission (NRC)-licensed Disposal Area (NDA) (WMA 7); and the State-licensed Disposal Area (SDA) (WMA 8).

IDA scenarios were selected based on the magnitude of radioactive or chemical materials at a facility or in a package. Other factors that were considered included the physical and chemical form of radioactive or chemical materials that made them more susceptible to environmental dispersion. For each onsite IDA scenario, a calculation of worker, maximally exposed individual (MEI) member of the public, and population doses was performed, as appropriate, using the same computer codes and conservative modeling assumptions that were used for Appendices I and J of this EIS. The MACCS2 V1.13.1 computer code (NRC 1998) was used to calculate radiological consequences. The MACCS computer code is described in detail in Appendix I, which also provides detailed discussions of the methods used in calculating radiation doses and their human health effects. Human health impacts of IDAs relative to the transportation of radioactive waste packages from WNYNSC were also analyzed for each site waste management alternative. The RISKIND 2.0 computer code (ANL 1995) was used to calculate radiation doses to the MEI and population from such an IDA. RISKIND, a code that has been extensively used in transportation accident analyses, is described in Appendix J of this EIS.

The radiological source term for each scenario was developed to represent the consequences of any carefully planned and executed IDA. Acute (short-term) and chronic (long-term) radiation doses were calculated, as was the likelihood of near-term and latent cancer fatalities from such doses. Health effects of acute exposure were assumed to appear within 1 year of exposure, and those of chronic exposure sometime later. Since the frequency of success of these postulated IDA scenarios cannot be quantified, no annual risk was calculated.

N.2 Scenario Development

For onsite IDA scenarios, a group of outsiders is postulated to gain entrance to WNYNSC with the help of an inside employee. These outsiders are carrying weapons, backpacks containing high explosives, and associated detonation equipment. They overpower and eliminate security personnel and gain access to the high-level radioactive waste tanks, Main Plant Process Building, radioactive waste package storage area, NDA, or SDA. They attach the explosives to preselected locations that allow for the breach of any containment or confinement structure or container and release of the maximum possible radioactive source term in the form of respirable airborne particles.

The assumed target is the High-Level Waste Tank 8D-B in WMA 3, which has a larger radioisotope inventory than the Main Plant Process Building, the waste packages, or the licensed disposal areas. Tank 8D-B is a bounding composite of Tanks 8D-1 and 8D-2, which are described in Appendix I of this EIS. The explosive charge brought on site is designed, located, and timed to fail the wall of the tank and cylindrical concrete vault, thereby creating a Radiological Dispersal Device (RDD). In this scenario, the radioactive material in the tank constitutes the material for dispersal, so the intruders need only bring in the appropriate quantities and types of explosive and associated detonation and timing equipment.

No IDA scenarios were analyzed for the NDA and SDA, due to two factors: (1) the radioactive material is distributed over a large area with a concomitantly small density and (2) radioactive material is interspersed with soil and affixed to solids resulting in a relatively small respirable release fraction from any IDA scenario. Tank 8D-B IDA consequences envelope NDA and SDA IDA scenario consequences.

Another IDA scenario analyzed for human health consequences is the attack of a group of outsiders on a radioactive waste transport vehicle en route from WNYNSC to a waste repository. The attackers are postulated to eliminate all crew and use weapons to penetrate the radioactive waste package confinement, resulting in a release of respirable radionuclides to the environment. The waste package with the largest radionuclide inventory is the fuel and hardware drum, which is only transported for the Sitewide Removal Alternative, as shown in Appendix I of this EIS. Therefore, the transportation scenario assumes an attack on a vehicle transporting such drums. The attack and resulting radionuclide release occur when the vehicle is traveling through the area with the highest population density along its route, thus delivering the highest population dose.

The fuel and hardware drum is not transported for the Sitewide Close-In-Place, Phased Decisionmaking, or No Action Alternative. The same IDA scenario assumptions for transportation are analyzed for these alternatives, but the containers are different: a Greater-Than-Class C Drum is used for the Sitewide Close-In-Place and Phased Decisionmaking Alternatives, and the Class A Box for the No Action Alternative. For each of the alternatives, a transportation IDA involving these radioactive waste packages has the greatest MEI and population consequences.

Appendix I of this EIS identifies the bounding toxic chemical as the beryllium that is present in the Main Plant Process Building. Therefore, another IDA scenario was postulated in which outsiders, with assistance from an employee, carry in and set off explosive charges in and around that building, creating a Chemical Dispersal Device (CDD) to release the maximum respirable quantity of beryllium into the atmosphere. Although its effects would include the release of radioactivity present in the Main Plant Process Building, the radioactive source term and human health impacts would be lower than those of the high-level radioactive waste tank RDD scenario.

N.3 Scenarios Considered but Not Analyzed

Other IDA scenarios that were postulated but not analyzed for this appendix are: (1) a commercial aircraft crash into the high-level radioactive waste tanks or Main Plant Process Building; (2) vehicular bomb detonation next to the high-level radioactive waste tanks, Main Plant Process Building, licensed disposal areas, or radioactive waste storage area; (3) use of armor-piercing missiles on the high-level radioactive waste tanks, Main Plant Process Building, or radioactive waste storage facility; (4) detonation of high explosives in the proximity of radioactive waste storage packages; and (5) use of an improvised nuclear device.

The aircraft crash was not analyzed because the radionuclide source term resulting from such a scenario at any of the locations that contain radionuclides would be enveloped by that assumed for the high-explosive detonation scenario analyzed for High-Level Waste Tank 8D-B.

The vehicle bomb scenario was not analyzed because it may not fail the confinement structure of the high-level radioactive waste tanks, Main Plant Process Building, or radioactive waste packages and is not estimated to result in a source term greater than that assumed for the analyzed IDA event at High-Level Waste Tank 8D-B.

Although armor-piercing missiles could fail confinement at the high-level radioactive waste tanks, Main Plant Process Building, or radioactive waste packages, the resulting source term would not be as high as that caused by the carefully designed and placed high explosives that are central to the IDA scenario for Tank 8D-B.

High explosives detonated next to high-level radioactive waste packages would fail their confinements and release a significant fraction of their radionuclide inventories. The effects, however, would be limited by the distance between the packages and that between the package and the explosive. (Explosive overpressure drops as the cube of the distance.) Thus, only a limited number of packages could fail and release radionuclides. Also limiting is the total radionuclide inventory of each package (see Appendix I of this EIS); between 23 and 2,500 packages would have to release their inventories to yield a source term equal to that assumed for the high-level radioactive waste tank IDA scenario. These limiting factors, in addition to the confinement integrity of each waste package, would not release a radiological source term equivalent to that of a failure of the high-level radioactive waste tanks.

The detonation of high explosives on or near the vitrified high-level radioactive waste stored at WNYNSC was not analyzed because the physical and chemical form of this waste would inherently restrict the release of respirable particles to the environment. Tests have shown that the material, which is similar to glass, is very resistant to fracture into very small respirable particles. Explosives or fires would more likely result in segmentation of some of this waste into large, nonrespirable solid forms (DOE 1994, EPA 1992).

An improvised nuclear device requires access to a critical mass of either weapons-grade plutonium or highly enriched uranium, along with extremely sophisticated high explosives and electronic detonation equipment. None of these materials are expected to be present at WNYNSC. Any plutonium or uranium that is present exists in a distributed and diluted form in liquid and solid wastes—not the single, relatively pure mass required for an improvised nuclear device. Thus, intruders would have to construct such a device with components obtained outside of WNYNSC and purposefully bring it onto the site for detonation. The low population density in the area of WNYNSC also makes the site less desirable as a target for an improvised nuclear device.

N.4 Source Terms

Calculations of the source terms for the high-level radioactive waste tank RDD, Main Plant Process Building CDD, and radioactive waste transportation IDA assume dispersal of a fraction of the entire waste inventory via a direct, open pathway to the atmosphere. The source term for the high-level radioactive waste tank RDD, presented as **Table N–1**, is based on a 0.1 percent (0.001) airborne respirable release fraction (DOE 1994) for the material at risk (MAR). Most of the radionuclide activity in Tank 8D-B (the same radionuclide activity assumed in Appendix I accident analyses) is fixed and in nonliquid form, making it more vulnerable to airborne release from the effects of an explosion. Also assumed (see Appendix I of this EIS) is a composite high-level radioactive waste tank, that is, a tank that has the largest inventory of radioisotopes and, thus, one whose breach would result in the highest radiation dose.

Table N–1 High-Level Radioactive Waste Tank Radiological Dispersal Device Source Term

Radionuclide	*Source Term (curies)*
Carbon-14	0.000020
Strontium-90	34
Technetium-99	0.0054
Iodine-129	6.8×10^{-6}
Cesium-137	250
Uranium-232	0.00060
Uranium-233	0.00026
Uranium-234	0.00010
Uranium-235	3.4×10^{-6}
Uranium-238	0.000031
Neptunium-237	0.00050
Plutonium-238	0.15
Plutonium-239	0.036
Plutonium-240	0.026
Plutonium-241	0.74
Americium-241	0.38
Curium-243	0.0036
Curium-244	0.080
Total	285.4

Source: WVNSCO 2005.

The source terms for the different packages that could be breached in a radioactive waste transportation IDA are presented in **Tables N–2, N–3,** and **N–4**. For the fuel and hardware drum, the source term is based on a 0.01 percent (0.0001) respirable release fraction; for the Greater-Than-Class C Drum and Class A Box, a 0.1 percent (0.001) airborne respirable release fraction. The different respirable release fractions reflect the distinctive nature and radionuclide content of the waste packages (DOE 1994).

Table N–2 Fuel and Hardware Drum Intentional Destructive Act Source Term

Radionuclide	*Source Term (curies)*
Tritium	0.0311
Carbon-14	0.0311
Cobalt-60	0.0027
Strontium-90	0.133
Yttrium-90	0.133
Cesium-137	0.173
Thorium-234	0.0000131
Uranium-238	0.0000131
Plutonium-238	0.0000131
Plutonium-239	0.00412
Plutonium-240	0.00221
Plutonium-241	0.0671
Americium-241	0.00799
Neptunium-237	7.94×10^{-7}
Curium-244	0.0000626
Total	0.56

Source: Karimi 2005.

Table N–3 Greater-Than-Class C Drum Intentional Destructive Act Source Term

Radionuclide	*Source Term (curies)*
Tritium	0.0020
Carbon-14	0.0000148
Iron-55	8.98×10^{-6}
Cobalt-60	0.000258
Nickel-63	0.000999
Strontium-90	0.00185
Yttrium-90	0.00185
Cesium-137	0.00235
Thorium-234	0.0000268
Uranium-238	9.28×10^{-6}
Plutonium-238	0.0267
Plutonium-239	0.0000363
Plutonium-240	0.000188
Plutonium-241	0.0105
Americium-241	0.000116
Total	0.047

Source: Karimi 2005.

Table N–4 Class A Box Intentional Destructive Act Source Term

Radionuclide	*Source Term (curies)*
Tritium	1.2×10^{-8}
Carbon-14	9.2×10^{-11}
Iron-55	5.6×10^{-11}
Cobalt-60	1.6×10^{-9}
Nickel-63	6.2×10^{-9}
Strontium-90	4.5×10^{-10}
Yttrium-90	4.5×10^{-10}
Cesium-137	4.4×10^{-9}
Thorium-234	5.8×10^{-11}
Uranium-238	5.8×10^{-11}
Plutonium-238	3.7×10^{-11}
Plutonium-239	5.5×10^{-11}
Plutonium-240	3.3×10^{-11}
Plutonium-241	1.2×10^{-9}
Americium-241	1.2×10^{-10}
Total	2.7×10^{-8}

Source: Karimi 2005.

The release plume for the waste transportation IDA is modeled for two different scenarios: a zero-energy, ground-level plume release and a plume with the energy of a fire created by combustion of the diesel fuel carried in the tanks of the transport truck. As in the case of the RDD, the plume energy assumptions for these two scenarios envelop both close and distant human health impacts.

N.5 Human Health Effects

Calculations by the MACCS and RISKIND computer codes and chemical dispersion modeling result in different human health impacts of the IDA scenarios discussed in Section N.2. Differences have been determined in radiological doses delivered to, and related latent cancer fatalities (LCFs)[1] for, the worker, the MEI, and the population at varying distances from the release site.

N.5.1 High-Level Radioactive Waste Tank Radiological Dispersal Device

The calculated radiation doses to the worker, the MEI, and the population within 80, 160, 320, and 480 kilometers (50, 100, 200, and 300 miles) of an RDD-induced failure of the high-level radioactive waste tank are presented in **Table N–5**. Two plume models were assumed for this scenario: ground-level and elevated-plume. The ground-level plume assumes that all the energy of the high explosives has been expended in failing the tank confinement and in aerosolizing radioactive material. The elevated-plume conversely assumes that all of the energy of the high explosives is available to the plume, resulting in an elevated release. These two diametrically opposite assumptions were used to calculate the range of close-in and distant human health consequences. Doses for the population beyond 80 kilometers (50 miles) were calculated to evaluate the public health impact of an elevated-plume in comparison to a ground-level plume. The analysis assumed no emergency response such as evacuation or sheltering of the population. This assumption is very conservative for the population 320 to 480 kilometers (200 to 300 miles) away, because the plume would not reach these distances for at least 1 day. According to the 2000 U.S. census and the 2001 Canada census (DOC 2008, ESRI 2008, Statistics Canada 2008), the U.S. and Canadian populations within 80, 160, 320, and 480 kilometers (50, 100, 200, and 300 miles) are, respectively, 1.705 million, 7.872 million, 25 million, and 75.1 million.

Table N–5 Radiological Consequences of High-Level Radioactive Waste Tank Radiological Dispersal Device

Radiological Dispersal Device Scenario	*Ground-level Release*		*Elevated-plume Release*	
	Dose	*LCF*	*Dose*	*LCF*
Worker (rem)	608 [a]	0.7	0.0177	0.000010
MEI member of the public (rem)	138	0.2	0.15	0.000090
50-mile population (person-rem)	3,600	2.2	5,860	3.5
100-mile population (person-rem)	4,610	2.8	8,240	4.9
200-mile population (person-rem)	5,240	3.1	9,620	5.8
300-mile population (person-rem)	5,890	3.5	10,700	6.4
Highest population average individual member [b] (rem)	0.0021	1.3×10^{-6}	0.0034	2.1×10^{-6}

LCF = latent cancer fatality, MEI = maximally exposed individual.

[a] This dose of 608 rem, equivalent to 0.7 LCF, can cause a fatality from acute effects in more than 50 percent of humans, but this fatality may be ameliorated by immediate proper medical treatment (NRC 2008, PNNL 2005).

[b] Calculated by dividing the total population dose by the total population for each of the four distances, the highest average for the four distances is presented. Ground-level and elevated-plume release doses are, respectively, 0.0006 and 0.0009 percent of annual background radiation dose, assumed to be 0.36 rem.

Note: LCF calculated by multiplying dose by 0.0006 LCF per rem (DOE 2002); an individual dose of 20 rem or greater is multiplied by twice the 0.0006 LCF factor.

Table N–5 shows that the ground-level release results in the higher worker and MEI dose, whereas the elevated-plume release results in the larger population dose. The largest worker dose (608 rem) results in 0.7 LCF, and the largest MEI dose (138 rem) in 0.2 LCF. The elevated-plume model results in about a 60 percent to 80 percent larger population dose than the ground-level release model. The difference is due to the combined effect of dispersion, dilution, and differences in population distribution at distances from WNYNSC. Although population dose increases with distance, the change in population dose relative to the

[1] Since fatal cancer is the most probable serious effect of environmental and occupational radiation exposures, estimates of cancer fatalities rather than cancer incidence are presented in this EIS. These effects are referred to as "latent" cancer fatalities (LCFs) because the cancer may take many years to develop.

increase in population is slight. The highest average individual dose in the population for the four distances analyzed occurs for the 80-kilometer (50-mile) population (0.0034 rem, or 0.94 percent of the U.S. average annual background dose). The largest population consequence within 480 kilometers (300 miles) is 6.4 LCF, assuming no emergency response, evacuation, or sheltering over this distance. The WNYNSC meteorological data used in the MACCS calculations include an average annual wind speed of 2.1 meters per second (4.7 miles per hour). At this wind speed, the plume would reach 80 kilometers (50 miles) 10.6 hours after its release. The time for the plume to travel 320 to 480 kilometers (200 to 300 miles) would be 43 to 64 hours. It is expected that emergency response actions, in the form of public evacuation and sheltering, could be taken during this time period, so that the population dose associated with these distances would be significantly lower.

N.5.2 Radioactive Waste Transportation Intentional Destructive Act

Workers were assumed not to survive a transportation IDA. The only dose receptors for this event are the MEI within 100 meters (328 feet) of the plume release and the population within 80 kilometers (50 miles). As in the case of the high-level radioactive waste tank RDD scenario, no emergency response, such as evacuation or sheltering of the population, is assumed within 80 kilometers (50 miles) of the IDA. The highest population density of the route is assumed so as to envelop the calculated population dose. Consequences for the three transportation IDA scenarios are presented in **Table N–6**, the low-energy plume assumes a release with no fire while the high-energy plume assumes a fire occurring simultaneously with the release.

Table N–6 Transportation Intentional Destructive Act Radiological Consequences

Radiological Consequence	*Low-energy Plume*	*High-energy Plume*
Sitewide Removal Alternative: Fuel and Hardware Drum		
MEI dose, rem	9.65	0.00347
MEI LCF	0.006	2.0×10^{-6}
50-mile population dose, person-rem	281	82.6
50-mile population LCF	0.17	0.05
Sitewide Removal, Sitewide Close-In-Place, and Phased Decisionmaking Alternatives: Greater-Than-Class C Drum		
MEI dose, rem	13.9	0.0389
MEI LCF	0.008	0.000020
50-mile population dose, person-rem	404	119
50-mile population LCF	0.24	0.07
No Action Alternative: Class A Box		
MEI dose, rem	1.1×10^{-6}	9.1×10^{-7}
MEI LCF	7.0×10^{-10}	6.0×10^{-10}
50-mile population dose, person-rem	0.000349	0.000346
50-mile population LCF	2.0×10^{-7}	2.0×10^{-7}

LCF = latent cancer fatality, MEI = maximally exposed individual.
Note: LCF calculated by multiplying dose by 0.0006 LCF per rem (DOE 2002). To convert miles to kilometers, multiply by 1.6.

N.5.3 Chemical Dispersal Device

The CDD source term assumes that the entire inventory (5.1 kilograms [11.2 pounds]) of beryllium in the Main Plant Process Building is released as respirable particles, and that the release lasts for 10 minutes under average atmospheric conditions. The result is a respirable particle concentration of 0.00043 milligrams per cubic meter within 100 meters (328 feet) of the building. Such a concentration is a factor of more than 200 below (i.e., about 0.4 percent of) the Emergency Response Planning Guideline 3 (ERPG-3) value of 0.1 milligrams per cubic meter. If conservative atmospheric dispersion were assumed, the air concentration within the same distance from the release would be 0.0021 milligrams per cubic meter, still significantly below the ERPG-3 value, and even below the respective ERPG-2 and ERPG-1 values of 0.025 and 0.005 milligrams per cubic meter (DOE 2007). Air concentrations below the ERPG-1 level do not cause any serious health effects.

Since the CDD-induced atmospheric concentration of beryllium at 100 meters (328 feet) from the release point is below the ERPG-3, ERPG-2, and ERPG-1 levels, similar results can be expected for all other toxic chemicals; concentrations should be significantly below their respective ERPGs. Accordingly, the risk to workers and the public due to the release of toxic chemicals to the atmosphere is very small. Nevertheless, a CDD is expected to result in toxic chemical deposition around the Main Plant Process Building area that will require cleanup, and workers within 100 meters (328 feet) of the CDD would presumably be injured from blast pressure and airborne debris associated with the explosion.

N.6 Summary of Intentional Destructive Acts Consequences

The IDA human health consequence analyses were performed for each IDA scenario and WNYNSC EIS alternative. The same computer codes (MACCS and RISKIND), analytical methods, and site models were used for these IDA scenarios as for accidents analyzed in Appendices I and J of this EIS. Regardless of alternative, the highest radiological source term for an IDA affecting onsite facilities is that associated with a breach of the high-level radioactive waste tank and the highest hazardous chemical source term from damage to the Main Plant Process Building. For the three action alternatives, the radioactive waste transportation IDA scenario with the most significant human health consequences is that involving the Greater-Than-Class C Drum; for the No Action Alternative, it is failure of the Class A Box. **Table N–7** presents a summary of the human health consequences of onsite facility and offsite transportation IDA scenarios for the alternatives. As indicated, the only distinction in consequences for each alternative is that for the radioactive waste transportation IDA. Radioactive waste transportation IDA consequences are significantly lower for the No Action Alternative, because only Class A waste is transported.

Table N–7 Range of Intentional Destructive Acts Human Health Consequences for the Alternatives

Onsite Radiological IDA		
Receptor	***All Alternatives***	
Worker	Fatal [a] (ground-level release) to 0.00001 LCF (elevated-plume release)	
MEI	0.2 LCF (ground-level release) to 0.00009 LCF (elevated-plume release)	
Population	2 LCF [b] (80 kilometer [50 mile] population, ground-level release) to 7 LCF [b] (300 mile population, elevated-plume release)	
Onsite Chemical IDA		
Receptor	***All Alternatives***	
Worker	No significant health impacts	
MEI	No significant health impacts	
Population	No significant health impacts	
Radioactive Waste Package Transportation IDA		
Receptor	***Action Alternatives***	***No Action***
Worker	Not applicable	
MEI	0.008 LCF (low-energy plume) to 0.00002 LCF (high-energy plume)	7.0×10^{-10} LCF
Population	0.2 LCF (low-energy plume) to 0.07 LCF (high-energy plume)	2.0×10^{-7} LCF

IDA = intentional destructive acts, LCF = latent cancer fatality, MEI = maximally exposed individual.

[a] Dose of 608 rem, equivalent to 0.7 LCF, may cause short-term fatality in more than 50 percent of humans, but may be ameliorated by immediate medical treatment.

[b] Lower consequences if there is emergency response such as sheltering or evacuation.

Another aspect of IDA consequences that can be evaluated is the vulnerable time period for each scenario. The vulnerable time periods for those scenarios are presented in **Table N–8** for each alternative. As indicated, the longest vulnerable time periods (i.e., highest consequences) are for the high-level radioactive waste tank RDD scenario; the shortest vulnerable time periods (i.e., lowest consequences) are for the Main Plant Process Building CDD and the No Action Alternative radioactive waste—specifically, Class A waste—transportation scenarios. The longest vulnerable time period for the high-level radioactive waste tank RDD is for the Sitewide Close-In-Place and No Action Alternatives; the longest for the radioactive waste package transportation scenario is for the Sitewide Removal Alternative. Since the CDD consequences are not significant, the difference between the Main Plant Process Building vulnerable time periods for the alternatives is not considered a significant discriminator of IDA risk.

Table N–8 Intentional Destructive Act Scenario Vulnerable Time Period for Each Alternative

IDA Scenario	*Alternative*			
	Sitewide Removal	***Sitewide Close-In-Place***	***Phased Decisionmaking (Phase 1)***	***No Action***
High-level radioactive waste tanks	25 years	In perpetuity	Up to 30 years [a]	In perpetuity
Main Plant Process Building	12 years	5 years	5 years	In perpetuity
Radioactive waste transport	62 years	7 years	8 years	In perpetuity

IDA = intentional destructive acts.
[a] The total vulnerable time period for the alternative will depend on the implementation decisions and schedule for Phase 2.
Source: WSMS 2008a, 2008b, 2008c, 2008d.

The data in Table N–8 provides a basis for a qualitative comparison of the IDA risks for each alternative, which is presented in **Table N–9**. Specific attention is accorded on site, off site (waste transport), and overall IDA risks, taking into account the vulnerable time period for each scenario. The No Action Alternative is judged to have the highest IDA risk because vulnerable onsite facilities remain in place and periodic offsite transportation of radioactive waste packages is expected to continue in perpetuity. The three action alternatives have lower IDA risks because they involve the demolition of onsite facilities that would otherwise constitute potential targets for IDAs, and because the offsite transport of radioactive waste packages would be temporary (albeit involving a higher radioactivity content than the No Action Alternative). The Sitewide Removal Alternative has a higher IDA risk than the other two action alternatives because it involves transport of the largest number of radioactive waste packages over the longest time period, and because removal of the Main Plant Process Building is deferred for longer than the Phased Decisionmaking (Phase 1) and Close-In-Place Alternatives (12 versus 5 years).

Table N–9 Qualitative Comparison of Intentional Destructive Act Risks for Each Alternative [a]

Type of IDA Risk	*Alternative*			
	Sitewide Removal	***Sitewide Close-In-Place***	***Phased Decisionmaking (Phase 1)***	***No Action***
Onsite radiological	High	Very High	Very High	Highest
Onsite chemical	Medium	Lowest	Lowest	Highest
Radiological waste transportation	Highest	Medium	Medium	Lowest
Overall	High	Medium	Medium	Highest

IDA = intentional destructive acts.
[a] A qualitative comparison of accident risks for each alternative is presented in Chapter 4, Table 4–23 and Appendix I, Table I–27, of this EIS.

N.7 Intentional Destructive Acts Emergency Planning, Response, and Security

The DOE strategy for environmental protection from extreme events, including IDAs or terrorism, has three distinct components: (1) prevent or reduce the probability of occurrence; (2) plan and provide timely and adequate response to emergency situations; and (3) ensure progressive recovery through long-term response in the form of monitoring, remediation, and support for affected communities and their environment.

DOE sites and facilities produce, store, use, and dispose of many different hazardous substances, including radioactive materials, toxic chemicals, and biological agents and toxins. In managing these hazards, DOE considers the safety of workers and the public to be of paramount importance. Owing to high standards for facility design, conduct of operations, safety oversight, and personnel training, DOE activities consistently achieve accident and injury rates that compare very favorably with those of the private sector.

The DOE employs a well-established system of engineered and administrative controls in key facilities to prevent or reduce the probability of occurrence of extreme events and to limit their potential impacts on the environment. This system has evolved over time and will continue to evolve as new environment, safety, and health requirements are identified, as new technologies become available, and as new engineering standards or best practices are developed. The framework and specific requirements for implementing this system of controls are embodied in the *Code of Federal Regulations* and DOE Orders. These are invoked as contractual requirements for DOE management and operating contractors. The DOE safety requirements and quality assurance guidelines and controls cover all aspects of the life-cycle of key nuclear and nonnuclear facilities—design requirements, construction practices, startup and operational readiness reviews, and routine operations and maintenance. They also cover deactivation and disposal activities required at the end of a facility's useful service life. The contractor and Federal staff associated with these facilities receive screening for trustworthiness and reliability. Moreover, they are trained to operate the facilities safely and to recognize quickly, and respond appropriately to, departures from normal operating conditions. Workers with a potential for exposure to harmful substances or radiation are enrolled in monitoring programs to safeguard their health and welfare. In addition to the oversight provided by DOE, reviews and audits of key facilities by outside experts play a role in reducing the probability of occurrence of many potentially extreme events associated with facility design, condition, or operation.

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